INDIGENOUS FOOD KNOWLEDGE AND CONSUMPTION PATTERNS OF JOHANNESBURG RESIDENTS

by

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DECLARATION

I declare that this research study is my own independent work and has been submitted to the University of Johannesburg for the Degree: Master's in Tourism and Hospitality Management and has not been submitted by me for another degree to another institution.

YEHSHANTHA GOVINDASAMI

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ABSTRACT

Indigenous foods have always been about sustenance and nourishment, but over the years, knowledge has largely depreciated leaving little to no knowledge of these foods. Indigenous foods relate to food crops found in specific places and known to be nutritious and able to fight disease. Nutrients such as protein, fat, calcium, carbohydrates, and various vitamins are found in indigenous foods, but due to modernisation people are led to perceive indigenous foods as inferior (Faber, Oelofse, Van Jaarsveld, Wenhold & Van Rensburg, 2010: 32). In addition, food preparation and processing methods affect the nutrients they hold. Indigenous foods play a significant role in food security for most African populations, and South Africa is no exception. South Africa's range of indigenous foods crops is quite extensive; however, urbanisation has affected the way people grow and consume foods in both rural and peri-urban areas. The study intended to address these issues, with its main objective being to determine the food consumption patterns of peri-urban and rural residents in Johannesburg.

A quantitative approach was used with self-administered questionnaires given to 208 participants within the peri-urban and rural areas of Soweto and Lenasia South. The questionnaires were handed out randomly within the chosen areas with the assistance of fieldworkers. The main findings showed that there was a reduction in the consumption of indigenous foods from rural to urban areas. People who had moved from rural to urban areas have adopted modern cash crops into their diet and reduced or stopped consuming indigenous foods. This left a gap in the knowledge of indigenous foods, as it is not passed on from generation to generation, specifically the high nutrient content, of which most people are unaware.

The findings from this research could assist in alleviating poverty and malnutrition in South Africa. By having a better understanding and knowledge of indigenous foods and the nutrients it holds, schools, poor areas and hospices can incorporate these into their menus. They would have the knowledge to grow the indigenous foods as well as knowledge on knowing which foods contain which nutrients. The study recommends that indigenous foods be produced and sold in more outlets, as well as implemented in feeding programmes so that individuals become more knowledgeable.

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LIST OF ABBREVIATIONS AND ACRONYMS

FAO	Food and Agriculture Organisation
NCDs	Non-Communicable Diseases

LIST OF DEFINITIONS AND KEY WORDS

- *Agriculture*: “The science and art of cultivating the soil, gathering crops, and rearing livestock” (Harris & Fuller, 2014:105).

- *Food deserts*: “Food deserts are areas where people have limited access to a variety of healthy and affordable food” (Dutko, Ver Ploeg & Farrigan, 2012:1).

- *Food insecurity*: This exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life (FAO, 2017:107).

- *Food security*: “When all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for a healthy and active life” (FAO, 2020a).

- *Food sovereignty*: “The right of people to define their own policies and strategies for sustainable productions, distributions and consumption of food with respect for their own cultures and their own systems of managing natural resources and rural areas” (Gordillo & Gerinimo, 2013:9).

- *Indigenous foods*: Indigenous foods crops refer to food crops that have their origin in South Africa; in addition, crops introduced into the country and now recognised as naturalised or traditional crops (Mbhenyane, 2017:5).

- *Joburg Market*: The largest fresh produce market in Africa, formerly known as Johannesburg Fresh Produce Market (Joburg Market, 2009).

- *Malnutrition*: Poor nutrition caused by an insufficient, over sufficient, or poorly balanced diet, or by a medical condition, such as chronic diarrhoea, resulting in inadequate digestion or utilisation of foods (American Heritage Dictionary, 2011).

- *Migrate*: “Move from one place of abode to another, especially in a different country” (OERD, 2002:915).

- *Non-Communicable Disease (NCD)*: Also known as chronic disease, are diseases of long duration and generally slow progression. The four main types of non-communicable diseases are cardiovascular diseases (like heart

attack and stroke), cancer, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes (WHO, 2019).

- *Nutrient*: A substance that provides nourishment for growth or metabolism. Plants absorb nutrients mainly from the soil in the form of minerals and other inorganic compounds, and animals obtain nutrients from ingested foods (American Heritage Dictionary, 2011).

- *Peri-urban*: The term peri-urban cannot be easily defined. It is a name that was given to areas situated between rural and urban areas (Iaquinta & Drescher, 2000:10.

- *Pesticides*: “A pesticide is known as a substance or mixture of substances intended for preventing, destroying and repelling any pests” (Zhang, Jiang & Ou, 2011:125).

- *Quantitative research*: Used to quantify the problem by way of generating numerical data or data that can be transformed into useable statistics. It is used to quantify attitudes, opinions, behaviours, and other defined variables, and generalise results from a larger sample population (DeFranzo, 2011).

- *Rural*: “In, of, or suggesting the country, pastoral or agricultural area” (OERD, 2002:1265).

- *Spaza shop*: Spaza, meaning camouflaged, is an informal convenience shop in South Africa, usually run from home. They serve the purpose of supplementing household incomes of the owners, and selling everyday small household items (Cambridge Dictionary, 2020).

- *Urbanisation*: “A broad-based rural-to-urban transition involving population, land use, economic activity, and culture, or indeed any one of these” (McGranahan & Satterthwaite. 2014:6).

- *Urban*: “Living, or situated in, a town or city” (OERD, 2002:1589).

CHAPTER ONE
BACKGROUND AND OUTLINE OF THE STUDY

1.1 INTRODUCTION

South Africa holds a large diversity of indigenous foods such as grains, leafy vegetables, and a variety of wild fruit types. Even though these food crops can grow in different weather conditions, production within the rural farming communities are on a very small scale and largely for subsistence purposes (Rankoana, 2017:63).

The lack of indigenous foods in South Africa has become worrisome. The nutritional and economic value that these foods hold could create a better South Africa, but due to the desire for convenience foods, rural communities have decreased the number of indigenous foods grown. With this being said, indigenous knowledge is slowly becoming absent in the modern generation and little to no knowledge is being passed on.

This research focused on the current knowledge levels of indigenous foods, specifically acquisition, preparation, and nutrition. It also looked at the consumption patterns of various indigenous foods of Johannesburg residents in specific areas.

The background of the research and the purpose of the study are included in this chapter, along with the rationale and objectives of the study. An in-depth literature review is found in Chapter 2.

1.1.1 Background of the study

In South Africa, many people are faced simultaneously with poverty, damaged and deteriorated environments, as well as limited access to safe drinking water and sanitation. With the unemployment rate at 27.6 per cent in the first quarter of 2019 (Stats SA, 2019:1), the access to nutritional food or other necessities is at an all-time low. South Africa is a developing country that has become highly westernised. The migration of more and more people from rural to urban areas has led to an increased loss of indigenous knowledge. In South Africa, indigenous foods have always been about sustenance and nourishment, containing nutrients that most

modern-day foods do not contain (Kaya & Masoga, 2005, cited in, Dweba & Mearns, 2011:565).

Rural communities hold most indigenous knowledge, but with people moving from rural to urban areas, it has been lost, and people have adopted the modern methods of food use (Magni, 2017:439); traditional or indigenous foods have been neglected or abandoned in favour of westernised foods. Modern foods become more easily available and cheaper to produce as they are more sought after. With modern farming methods taking over traditional cultivation methods, forests or farms that were used to grow wild vegetables have been cleared to make way for farms to grow modern crops (Dweba & Mearns, 2011:566).

Indigenous knowledge is not widely documented; therefore, it cannot be passed onto future generations, thus leading to an even greater decline in consumption, especially in the younger generations (Akinola, Pereira, Mabhaudhi, de Bruin & Rusch, 2020:3). Modernised food, high in sugar and fat, and low in nutrients, is widely advertised, consuming the minds of many, while there is little to no knowledge of indigenous foods and the positive effects this food holds.

1.2 RESEARCH PROBLEM

There are many food insecurity and malnutrition problems facing South Africa and it is evident that not much has been done to stop or alleviate this problem. South Africa's range of indigenous foods crops is quite extensive from fruits and vegetables, to grains. These indigenous foods contain high amounts of nutrients needed on a daily basis for people's bodies to function properly (Mbhenyane, 2017:6). The crops indigenous to South Africa grow in all regions, under various weather conditions and mostly in rural farming areas; however, with people wanting more modernised foods, crops wanted by the public are grown instead, at prices many cannot afford. Indigenous foods are consumed less and not much knowledge exists in the younger generation (Akinola et al., 2020:3).

1.2.1 Problem statement

Johannesburg residents lack South African indigenous foods usage and consumption knowledge. The processes by which indigenous foods were sourced, prepared, and consumed were undocumented, leaving very little knowledge (Okoye & Oni, 2017:75).

With South Africa having such high malnutrition and under-nutrition rates, it is important to identify which indigenous foods contain high nutritive contents. By obtaining information from urban and rural residents in the South of Johannesburg, indigenous foods acquisition and consumption patterns could be identified. Indigenous foods in South Africa have many unanswered questions as there have been limited research done on it. With South Africa being faced with a widespread of malnutrition and food insecurity, an increased focus on indigenous foods could aid its combat (Kasimba, Motswagole, Covic, & Claasen, 2018:1200).

1.3 RATIONALE OF THE STUDY

Indigenous foods, as stated by Mbhenyane (2017:5), are "food crops that have their origin in South Africa. Added to these crops are those that were introduced into the country and are now recognised as naturalised or traditional crops. They are divided into three main categories; namely grains, vegetables, and fruit". South Africa has a diverse range of indigenous foods that thrive in various weather conditions in all regions; however, these are harvested and grown in rural areas as a form of subsistence farming and not for commercial use. According to Akinola et al. (2020:12), the main challenges that have been associated with indigenous foods are:

- Fragmentation in the sector;
- Most are found and harvested in the wild;
- Production and consumption have declined; and
- Limited and undocumented information, which is due to the low number of studies that have been conducted.

Even though there are various challenges associated with the crops, they carry many advantages, such as high nutritional value, drought, pest, and disease resistance, low input requirements, and adaptability to marginal areas (Akinola, et al., 2020:3493).

The literature on indigenous foods and related knowledge as a whole is very limited and not much research has been performed. Extant research shows mostly the high amount of nutrients that indigenous foods contain as well as the various types of indigenous foods. There was limited research found on the acquisition of such foods and the reason for the reduction of consumption, but nothing in clear detail. There is a clear need to understand the scarcity of indigenous foods, and related knowledge, in South Africa (Agribook Digital, 2020).

This study was an opportunity to gain insights into the availability (or lack thereof) of indigenous foods in South Africa. It helped to determine the most commonly consumed indigenous foods, the frequency of, and the reason for their consumption. Lastly, this study showed the sourcing of indigenous foods, the preparation methods involved, and the effect of these methods on the nutritional composition. This study was conduction in peri-urban and rural areas around Soweto and Lenasia South.

1.4 OBJECTIVES OF THE STUDY

1.4.1 Main objective

- To determine the indigenous foods knowledge and consumption patterns of peri-urban and rural residents in Johannesburg south.

1.4.2 Sub-objectives

- To determine the knowledge levels of the residents in Johannesburg south on the various types of indigenous foods.
- To determine the most commonly consumed indigenous foods and the frequency (daily, weekly, monthly) at which indigenous foods are consumed by residents in Johannesburg south.

- To identify the reasons for consumption of indigenous foods, and the sourcing and preparation of indigenous foods by residents in Johannesburg south.

- To compare the indigenous foods knowledge and consumption patterns of peri-urban and rural residents in Johannesburg south.

1.5 RESEARCH QUESTIONS

1.5.1 Main question

- What are the indigenous foods knowledge levels and consumption patterns of peri-urban and rural residents in Johannesburg south?

1.5.2 Sub-questions

- What are the knowledge levels of the residents in Johannesburg south on the various types of indigenous foods?

- What are the most commonly consumed indigenous foods and how frequently are these foods consumed (daily, weekly monthly) by residents in Johannesburg south?

- What are the reasons for consumption of indigenous foods, and in what manner are such foods sourced and prepared by residents in Johannesburg south?

- How do indigenous foods knowledge levels and consumption patterns of peri-urban and rural resident's in Johannesburg south compare?

1.6 OUTLINE OF CHAPTERS

- Chapter 1 provides the background of the study and clearly identifies the gap in the literature that this study would fill.

- Chapter 2 summarises the literature that is relevant in this research project. It discusses the gaps in the literature and how this research would fill one or more of these gaps. The focus of the literature review includes the nutrients and preparation of indigenous foods, indigenous foods sourcing and

consumption patterns, rural and peri-urban areas, and malnutrition and food insecurity in South Africa, among others.

- Chapter 3 provides the research methodology most suitable to address the research question. It outlines the various data collection instruments and techniques used to analyse the collected data. It further explains the population and sampling, data sources, and research ethics.

- Chapter 4 provides the findings of the study and clearly outlines the results of the data analysis with appropriate use of tables and graphs.

- Chapter 5 discusses the limitations of the study as well as documenting the meeting of the research objectives. It provides conclusions and recommendations regarding various indigenous foods aspects, as well as suggestions for further studies.

1.7 SUMMARY

This chapter identifies all the problems faced with indigenous foods and although research exists, it is not enough to answer the research questions as it focuses on other aspects and not the consumption patterns and knowledge levels surrounding indigenous foods. With the objectives generated, this study provided a better understanding of indigenous foods.

In the next chapter, the literature surrounding indigenous foods is discussed.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

South Africa is such a culturally diverse country, from the locations and many different languages that are spoken, to the wide variety of indigenous foods linked to the various cultures. Research frequently mentions indigenous foods and their benefits; however, over time this knowledge and understanding have decreased. This chapter explores the existing literature looking at the trends and discussions surrounding indigenous foods knowledge and consumption patterns of these foods. It provides further information on how these foods are sourced and prepared, and the nutrients they contain, thus providing a better understanding of indigenous foods.

2.2 BACKGROUND AND KNOWLEDGE ON INDIGENOUS FOODS

Indigenous foods are known as foods from a natural environment, which are included in the cultural food use patterns for a group of indigenous people, in a particular area, and originating within the country (De Bruin, 2018:10). They are recognised as traditional crops and can be divided into three main categories, grains, vegetables, and fruits (Omotayo, Ndhlovu, Tshwene & Aremu, 2020:15). The importance of indigenous foods, with regard to decreasing food insecurities through commercial planting, has been widely discussed. According to Agribook Digital (2020), indigenous foods originating within a country has adapted to the natural conditions and climate of the country, and are resistant to drought, pests, and diseases.

Within developing countries indigenous people from cultural homelands in some of the most rural communities have encountered challenges to ensure health and food security even with the use of their traditional food systems (Kuhnlein Erasmus, Spigelski & Burlingame, 2013). According to Nabahungu and Visser (2013:370) many local communities and farmers in developed and developing countries from all over the world have skills, expertise, knowledge, and practices related to food security and agricultural production.

Indigenous people possess rich and diverse language, cultural knowledge, traditional values, and standards of living. These very components form the basis of their cultural heritage. Indigenous people have stored traditional knowledge in their collective memory for centuries and we see it through the day-to-day activities of both men and women. Cultural values and beliefs, rituals, local languages, tools, plant species, and animal breeds are all ways in which this knowledge is expressed (Magni, 2017:438). Traditional food systems have depleted over time, but work on traditional food systems is highly important for future generations as it helps people to maintain their connection with their culture and nature (Jamieson, Weiler, Kuhnlein, & Egeland, 2012:764). According to Jamieson et al. (2012:766), having traditional food systems in place helps to improve health and create better community support.

All indigenous people from across the world have their own educational needs and responses to different strategies for carrying information that may be required. Learning by doing is a well-known method used for developing knowledge and skills (Hasni, Halim, Omar & Ghazali, 2018:2351).

In the 21st century, indigenous foods have become largely depreciated and generally only consumed in extreme rural communities through subsistence farming. This is due to the lack of publicity as modernised foods were commercialised and consumed more frequently (Dweba & Mearns, 2011:568). It is of utmost importance to be able to identify these foods and their preparation processes so that it can be mass-produced and become widely established and consumed throughout the country (Cidro, Adekunle, Peters & Martens, 2015:26).

2.3 URBAN, PERI-URBAN, AND RURAL AREAS

Major cities in South Africa have encountered huge changes. When the new born democracy came about in 1994, it caused enormous migrations from the countryside and rural areas to urban areas, as people were in search of a better life. Due to the insufficient amount of residential space, areas on the outskirts of South African cities, as well as abandoned plots, have been inhabited by informal settlements. These houses a multicultural population in sub-standard conditions

creating peri-urban environments (Macagnano, 2002:158). A discussion of these three types of areas follows:

2.3.1 Urban areas

Urbanisation has had a huge effect on rural communities. Urbanisation and higher incomes are affiliated with changes in diet and type of food consumed, and various trade patterns. The urban community eat a smaller quantity of staple grains and little to no indigenous foods, but consume a higher quantity of animal and dairy products, and processed foods, and a greater percentage of food is consumed outside of their home (Kearney, 2010:2793). At the beginning of the 19th century, only two per cent of the world's population lived in urban areas; over time this has continued to increase; however, the rate of urbanisation had varied from country to country. Over 80 per cent of people already live in urban and peri-urban areas in North America, while in countries in Africa and Asia urbanisation is developing at a fast pace, but the majority of their populations remain rural (Custodio, Demant, Laborte & Ynion, 2016:23).

The shift between rural and urban is one of the fastest and most intense changes in human history. Urbanisation has brought about great benefits, such as the rise in human productivity and global income, and the satisfaction of basic human needs; but it also causes issues such as social, economic, and employment instability with extreme income inequality and environmental pressure and degradation (Reardon, Boughton, Tschirley, Haggblade, Dolislager, Minten & Hernandez, 2015:58). Urbanisation has changed the relationship humans have with food. Urban populations now consume food without direct engagement with its production or with the food producers. In rural communities, people consume cheaper produce and are in direct contact with the food producers, if they are not directly producing food for themselves and their family. Despite the ubiquity of modern foods and diets, people in rural communities do not have the money or resources to enjoy it (Sonnino, 2016:196; Goldstein, Birkved, Fernandez & Hauschild, 2017:157).

2.3.2 Peri-urban areas

The term peri-urban cannot be easily defined. According to Pauleit, Wafa and Pribadi (2019:19), it defines the areas around and in-between the communities in

urban regions. It is a mix of rural and urban; partly urbanised areas into which more and more people are moving. In a study conducted by Iaquinta and Drescher (2000:7), people from rural areas do not move directly into large cities or fully urbanised areas, but rather to small towns or villages (peri-urban areas), or build within their rural villages to create peri-urban areas. An urban settlement or area is structured and organised, services such as electricity, water, and refuse removal are provided, and roads are planned and maintained by the council (Roopawula & Bhatt, 2017:1). These definitions show the differences between urban and peri-urban areas. Urban areas are structured and planned, whereas peri-urban areas may have good housing but good roads or services, such as availability of water, are lacking.

Peri-urban areas have the potential to play a positive role in strengthening urban sustainability, as it is a mix of urban and rural areas. Peri-urban areas are generally found at the urban border and usually have lower density settlements (Wandl & Magoni, 2017:2). Residents within a peri-urban area have knowledge about using rural and urban areas to their benefit, such as growing crops from rural areas and building their own home in a peri-urban setting. They create a better life at a lower cost than in urban areas. Communities in peri-urban areas are made up of a variety of groups of people who have different interests, which means a change in lifestyle: more leisure activities, and accessible shops and workplaces (Tian, Ge, & Li, 2017:478). The growth of peri-urban areas could become one of the main development trends in the future; with urbanisation and cost of living increasing, people wanting a better life on a budget create more peri-urban areas (Bieganska, Sroda-Murowska, Kruzmetra & Swiaczny, 2018:129).

2.3.3 Rural areas

The term rural could mean many things to many people such as small towns, landscapes, isolation, as well as low population density (Beyazli, Aydemir, Öksüz & Özlü, 2017:225). With no universal definition it is not that simple to define a rural area. The variable most used in the definition is population density (Lutero, Pianura & Pizzoli, 2009:9). According to Lutero et al. (2009:10) and Beyazli et al. (2017:229), a territory is known as rural if the population density is below 150 inhabitants per square kilometre; it is an area which lacks structured housing, electricity, water, and

roads to name a few. The rural population have a higher number of elderly people and children. Their unemployment and underemployment rates are higher, as rural communities must travel long distances to places of employment and health care providers (Hart, Larson & Lishne, 2005:1150).

Indigenous people that live within their rural homelands rely on traditional food systems where food is harvested with the traditional knowledge of the natural environment, passed down through the generations. Harvested indigenous foods are prepared and sold in a local cultural setting (Harriet, 2013:6).

2.4 MALNUTRITION AND FOOD SECURITIES IN AFRICA

According to FAO (2017:107), food insecurity is defined as “a problem that exists when people lack secure access to sufficient amounts of safe nutritious food for normal growth and development and an active and healthy life”. Food insecurity can be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food within the household. The number of undernourished people in the world is sitting at an estimated 690 million people, if this trend continues the number will exceed 840 million by 2030 (FAO, 2020b). Sub-Saharan Africa has one of the highest and worst rates of food insecurity with nearly one in ten people suffering from severe food insecurity. A study conducted by the FAO (2017:41) showed that there are 22 countries suffering from food insecurity, 16 of which are in Africa. Africa has been experiencing several episodes of severe food insecurity causing an immense loss of life and livelihoods over the past decades. Climate related events could increase food insecurity in terms of both availabilities as well as access. For instance, drought can reduce livestock and agricultural productivity. In a case where there may be severe drought it can threaten local food security especially in rural areas (FAO, 2017:13).

According to FAO (2017:108), malnutrition is an abnormal physiological condition caused by inadequate and unbalanced consumption of macro- and micronutrients. The deficiencies associated with malnutrition are under-nutrition and over- nutrition. Malnutrition has been estimated to contribute to more than a third of all child deaths. Developing countries, like South Africa, have one of the highest malnutrition rates, which result in 54 per cent of deaths in children (Bain, Awah, Geraldine, Kindong,

Sigal, Bernard & Tanjeko, 2013:122). It can be a problem resulting from lack of access to food and inadequate nutrient intake; or it could be an excessive intake of food, which results in increased body weight and might lead to diet related non-communicable diseases and health problems (FAO, 2017:14). Rural areas seem to suffer the most from malnutrition, with low levels of education especially in women, and excessive droughts and floods, it is hard to live a sustainable life. (Bain et al., 2013:6).

The current food patterns of African people are a limited intake of indigenous food that once carried health and nutritional status. Urbanisation has a massive effect on knowledge of the usefulness of indigenous foods, and it shows in the reduction of consumption of these foods. People from rural communities have a higher risk of malnutrition and other nutrition-related diseases due to this dietary change (Cockx et al., 2018:145). According to the South African National Food Consumption Survey of 1999, a large number of children had an insufficient intake of energy, Vitamin A, Vitamin C, riboflavin, Vitamin B6, Vitamin B12, folic acid, and zinc. Okoye and Oni (2017:75) stated that in South Africa indigenous foods plays an important part in reducing hunger and malnutrition.

Even though there is a huge global economic growth in some of the poorest countries in recent years, millions of people suffer from food insecurity and malnutrition, and not enough effort is being made to alleviate or eliminate the problem.

2.5 SOURCING OF INDIGENOUS FOODS

Sourcing of food relates to the food's origination and its growth. Farmers have to understand the local growing requirements, crop compatibility, and weather patterns. Since ancient times, farmers or those who grow crops have learnt how to grow healthy crops year after year on the same land; this knowledge has be passed down from generation to generation (Autade, Jadhav, Gaiker, Jari & Reddy, 2015:754).

2.5.1 Farming systems

Growing crops or raising livestock can be done in many different ways. The three main systems are discussed:

- *Small-scale farming*: Farmers grow food for themselves and their families, and if they have extra, for the local market. They grow local foods and common foods like maize (UN Environmental Programme, 2020:3). Local foods are grown using traditional knowledge passed down through the generations, which is tested and improved on as conditions change. The local plants are well adjusted to the growing conditions of the country (Jouzi, Azadi, Taheri, Zarafshani, Gabrehiwot, Van Passel & Lebailly, 2017:147). In a study In Kenya, it was found that small-scale farmers often share seeds with other small-scale farmers after harvest. The farming community come together and share the knowledge, trade seeds of local crops, like millet, sorghum, squash, and cowpeas. The women and men come together and share recipes and ideas as well (Oduor, Waweru, Lenohner & Neustaedter, 2018:9).

- *Industrial farming*: Large-scale farming is a modern method of farming that uses scientific, economic, and technical methods to mass-produce food resources, such as tractors and pesticides that cannot be found on the farm. Industrial farming operates with tractors and other modern farming machinery, and in many cases use chemical fertilizers and pesticides and grow crops that are genetically modified (Natural Reseource Defense Council, 2020:1). Industrial farmers sell their entire crop unlike small-scale farming where it is distributed and consumed by many. Grains, fruit, and vegetables bought at grocery stores all around the world are produced using industrial farming. Having a large supply of food produced and sold at grocery stores has changed the way people eat in many countries across the world. In Western Canada and the United States (US), industrial farmers grow grains, like wheat, on large pieces of land, and buy fertilizers to ensure the nutrients are returned to the soil. In addition, they must ensure sufficient seed for planting, fuel to run the various machines, and pesticides to kill off all unwanted crop pests (Magnan, 2015:7).

- *Mixed farming systems*: There are many types of mixed farming systems dependent on external factors (weather patterns, technology development, market prices) and internal factors (local soil characteristics, fruit and vegetables grown). It is a system where the farmers conduct various agricultural practices together, such as crops and livestock. This helps with wider crop rotations and reduces the dependence on chemicals. The waste products from one activity can provide inputs to others, such as the dung from cattle as a fertilizer, and enhance the production of a diverse range of nutritious food (Descheemaeker, Zijlstra, Masikati, Crespo & Tui, 2018:289). In China's Zhejiang province, rice paddies are situated in naturally flowing rivers that contain a fish called Corp, which is a huge source of protein and income for farmers (Yang, Oheng, Li, Yao, Li Z, Luo, Yuan & Zhang, 2016:783).

Once these foods are produced and processed, they are sold at various outlets. These outlets differ in urban and rural areas. In most cases, small-scale farming produce is found in rural areas, while industrial farming produce would be for peri-urban to urban areas.

2.5.2 Farming methods

In modern times, the method used to grow a food, steers the choices people make when buying food; some people are anti pesticide while others are all for genetically modified food, and these differences need to be considered. The three main methods used for farming are conventional, organic, or genetically modified, which provides insights into people's choices of food:

- *Conventional method*: Farmers use chemical fertilizers to increase plant growth. The use of pesticides, insecticides, and herbicides are used on crops, and animal farmers use antibiotics and growth hormones to improve the growth and health of animals. The aim of conventional food is to produce more food that costs less money, in a shorter space of time. (Muneret, Mitchell, Seufert, Aviron, Petillon, Plantegenest, Thiery & Rusch, 2018:361: Pimental, Hepperly, Hanson, Douds & Seidel, 2005:580).

- *Organic method*: Organic foods are foods that are grown without the use of growth regulators, pesticides, synthetic fertilizers, additives, or bioengineered genes. When growing organic food, farmers have set regulations to follow, which vary from country to country. These regulations cover everything from soil quality, pest control, and animals raising techniques. Organic soil better conserves water, combats erosion, and fosters biodiversity. This method is more costly and labour intensive but is healthier for humans and for the environment (Reganold & Wacher, 2016:6).

- *Genetically modified method*: Genetically modified foods have had changes made to their genetic material; specific genes are transferred from one organism to another, specifically to provide higher nutritional value, protect crops against pests and disease, and help make weed management safer. Genetically modified foods are said to have lower production costs for farmers, creates durability, and have a longer shelf life (Bonny, 2016:38). According to Zhang C, Wohlhueter, and Zhang R. (2016:120), genetically modified cotton produces an insecticide to kill a specific pest, 90 per cent of papayas grown in Hawaii are genetically modified to be resistant to the ringspot virus, and 95 per cent of sugar beet in the US has been modified to be resistant to herbicides.

2.5.3 Access to food

Food deserts are known as “areas where people have limited access to a variety of healthy and affordable food” (Ver Ploeg, Dutke & Breneman, 2015:205). Food deserts affect the way in which people from different areas source their food.

In rural areas, having access to healthy and affordable food has been and continues to be a struggle. Many rural areas have little to no access to food retailers. Access to food may be limited not only due to transportation challenges, but also because of financial constraints. People from rural communities sometimes rely on expensive and less nutritious food, like that available at petrol station convenience stores, rather than having to travel to a nearby town with a proper grocery store to stock up on fresh products (Proctor & Berdegue, 2016:2). Financial constraints have been one of the biggest problems facing rural communities as usually only one or two

people within the household work, and they attend to expenses like clothing, school fees, and gas for cooking. These expenses add up, leaving only a small amount for food; it is very rare that rural residents have access to proper nutritious food. This increases the risk of chronic disease, and in the long-term, physical and mental health problems, learning and development issues, and economic changes like unemployment. Unemployment has affected rural areas widely, as it is difficult to find permanent employment; most residents in rural areas rely on day-to-day earning opportunities (car washing, painting, gardening, and building) for money (Van der Ploeg, 2018:17).

Rural residents search for various shops in the town, some items are cheaper in one shop, while more expensive in others. Fruit and vegetables are easily accessible and are not hard to source in rural communities, as many of the small-scale farmers sell them on the roadside or in spaza shops in the area. The fruit and vegetables sold are fresh and sold throughout the year, as they are easy to grow and adapt to the local conditions. However, living pay check to pay check, little is affordable; having meat and poultry is expensive and not easily available in rural areas (Ko, Enzler, Perry, Rodriguez, Mariscol, Linde & Duggan, 2018:634).

Many rural areas lack a population large enough to support a grocery store or large food market that can stock a diverse range of healthy nutritious food at affordable prices. Rural families create small stores in the community that have higher prices and a smaller selection of good foods. So, the main problem small rural communities face is the sourcing of foods, access to quality foods, distance to stores with healthy foods, limited transport access, and low incomes (Abu & Soom, 2016:63).

A study conducted by Khoo and Knorr (2014:1), in the United States of America, identified a global shift in population from rural to urban areas. Urbanisation has caused a huge demographic shift. Moving to a peri-urban or urban area comes with better standards of living, social and health services, education, and economic growth. Even though many people made the vast change from rural to urban, many issues have arisen, such as food and nutrition security and urban poverty. According to Khoo and Knorr (2014:2), food demands and dietary patterns in urban areas have changed to more convenient and prepared foods due to better incomes and long working hours, but these foods are high in salt, fat, and sugar.

Living in a peri-urban or urban area, residents are surrounded by shopping malls, large infrastructure, transportation, and so much more; foods are easily accessible to the residents. With technology improving, sourcing foods in the urban area is as simple as the touch of a button. Large grocery stores offer online ordering services with groceries delivered to the customer's door. Shops are usually in close proximity of one another, and in some places even within walking distance; however, if a resident does not drive or walk to the shops, there are many types of transportation methods available such as taxis, Uber, and taxify (Crush & Battersby, 2016:49). Any type of food needed can easily be sourced; GMO food, organic food, and conventional food are widely available in urban areas. Despite their exposure to such a large range of nutritious food, many urban residents seek foods from restaurants and fast food outlets, as it is convenient (Odunitan, Okop, Dover, Alaba, Micklesfield, Puoane, Uvs, Tsolekile, Levitt, Battersby & Victor, 2018:5).

Rural areas do not have the advantages that peri-urban and urban areas have; although rural residents can buy nutritious food, it is expensive, as is transportation, thus they settle for what is easy and accessible today (Lenardson, Hansen & Hartley, 2015:49).

In Botswana, supermarkets are known to be one of the biggest food distributors and have a large variety of processed, imported, and packaged foods. Between 50 and 60 per cent of food retail is handled by supermarkets in Botswana's cities and major urban villages. A large number of urban households are reliant on supermarkets as a source of food, which has had a huge impact on the country's diverse, local, traditional, and indigenous diets. Indigenous foods can be purchased from supermarkets and are sometimes acknowledged by locals but not always bought due to the want for more modernised processed foods. If the need decreases, supermarkets will be forced to stop selling the local indigenous foods (Kasimba et al., 2018:1201).

Lusaka is the capital city of Zambia and is known to be one of the fastest growing cities in southern Africa. The dietary structure and quality of food ranges across social economic groupings of residents; the wealthier have a more varied diet, while poorer sections rely on staples like wheat and maize and a few basic vegetables and condiments. Most of the city's food is purchased on reoccurring visits to small

shops, markets, as well as informal vendors. Many of the residents find it difficult to purchase large quantities of food at once. Again supermarket customers tend to be from richer households while lower income household's food is bought according to food type, such as meat, bought from small shops, eggs, vegetables, and milk from the informal street sellers (Jennings, Cottee, Curtis & Miller, 2015:20).

Over the years, Colombia's Bogota has preserved a strong supply chain of traditional foods. Even with the growth of the supermarket sector, only 25 per cent of grocery sales are made at supermarkets. The rest of the food purchased comes from markets and the informal settlements. The small shops play an important role for low-income neighbourhoods. In Bogota, 80 per cent of staple food is produced within a 300-kilometre radius. Over 60 per cent of these foods are produced by small-scale farmers, who produce food such as bananas, yucca, vegetables, sugar cane, chicken, eggs, potatoes, rice, and beef (Jennings et al., 2015:23).

In Maputo, Mozambique, the majority of the households get their food from informal sellers at least once a week and some on a daily basis. Markets are considered one of the best places to shop, as this is where low prices and fresh food can be found. Supermarkets and hypermarkets were used for shopping mainly because it was close to entertainment, but also for its cleanliness and higher quality food (Proctor & Berdegue, 2016:6).

Within the Southern African region, there has been rapid growth of supermarkets for basic food for the urban poor. However, in South African cities like Johannesburg, Cape Town, and Durban, where over 90 per cent of poor urban households source their food from supermarkets, pressure has been placed on smaller outlets (Frayne & Crush, 2017:40).

There is huge diversity on how each city is fed; caused by aspects such as history, politics, culture, size of urban centres, the rural population, and the sprawl of surrounding countryside (Ahmad, Sheikh & Saeed, 2015:163). Rural and urban areas will always be linked as one depends on the other. Most urban centres are dependent on their food supply from rural areas, not only locally, but also globally. The sourcing of food in rural and peri-urban or urban areas is based on many factors that change from country to country. Although income plays a major role, it affects

both rural and urban communities. Most peri-urban and urban communities mainly prefer supermarket and food markets but in some countries, residents within the urban area prefer getting food from informal shops as it is fresher. Rural communities mainly source food from spaza shops and vendors, or grow their own; their remaining food needs are met at convenience stores or from supermarkets; however, it is all dependent on the country or city. Food is sourced in so many ways, but the residents have the final say in where they would prefer to shop (Cockx, Colen & De Weerdt, 2018:141).

2.6 NUTRIENTS OF INDIGENOUS FOODS

Throughout African history, indigenous foods were easily sourced and grown for medicinal use due to the high amounts of nutrients they held. Traditional and indigenous foods have been the main source of food for many rural communities; however, as the years progressed this has shifted, as there is a high production of cash crops or modernised foods, which has caused a massive change in the diet of African people (Frison, Smith, Cherfas, Johns & Eyzaguirre, 2005:113). Indigenous foods include fats, calcium, protein, various vitamins, as well as carbohydrates and most times are a better nutritional source than modern vegetables. Due to modernisation of South African rural communities, people are led to perceive indigenous foods as inferior (Faber, Oelofse, Van Jaarsveld, Wenhold & Van Rensburg, 2010:501). Knowledge on the use of indigenous plants needs urgent research and documentation before it is irreversibly lost to future generations.

Agricultural development focuses primarily on the calorific content and less on the nutritional value of foods (Hunter & Fonzo, 2013:12). There is a focus on improving the overall agricultural productivity of major crops (cash crops), which often does not equate to an increase in the quality of nutrition, and has seen increased incidents of obesity as well as micronutrient shortages (Frison, Cherfas & Hodgkin, 2011:243 ; Zhao, Yu, Tan, Zheng, Zhao, Wang & Zhang, 2017:440). One of the highest percentages of malnourished people globally is found in sub-Saharan Africa. Almost half the children that are under the age of five years are undernourished, many of whom are stunted and suffer from anaemia (FAO, 2011:1). Increasing the intake of indigenous fruit and vegetables can address the issues faced in sub-Saharan Africa and worldwide. Indigenous vegetables and fruit hold many essential minerals,

vitamins, and antioxidants, which have disease-fighting properties, and reduce the risk of non-communicable diseases. Indigenous fruit and vegetables have equal or higher mineral and vitamin content than that found in apples and cabbages, which are popular commercially available varieties (Abukutsa-Onyango, 2005:113; Kansiime, Ochieng, Kessv, Karanja, Romney & Afari-Sefa, 2018:481).

Indigenous plants grow voluntarily in natural ecosystems and as aforementioned, have been used as food and medicine in almost all communities for many generations (Bhattacharjee, Kothari, Priya & Nandi, 2009:1). Despite it being known that indigenous foods hold many nutrients beneficial to health, the use of indigenous foods have declined drastically because of their non-availability. In addition, insufficient investment in research and development is a major cause in the loss of indigenous foods (Mbhenyane, 2017:5). The lack of indigenous foods is not only an issue in South Africa, but also globally, where traditional foods from local environments have received global attention due to their potential to provide a better quality as well as a more sustainable diet (FAO, 2014:220). Many studies provide information on the various benefits of indigenous foods with regard to food security, health, and dietary diversity; however, only a few studies outline the specific nutrient intake from indigenous or traditional foods. Research done among some arctic Canadians had indicated noteworthy differences in the micronutrient intake for households who consumed indigenous foods compared to those who consumed non-indigenous foods (Johnson-Down & Egeland, 2010:1315). According to an Alaskan study (Johnson, 2009:21), candidates that consumed indigenous foods had more vitamin A, vitamin D, vitamin E, and iron than those who consumed cash crops. Studies conducted by Roche, Creed-Konashiro, Tuesta and Kuhnlein (2008:461) in Peru, and Ghosh-Jerath, Singh, Mogsumbel, Kamboj and Goldberg (2016:549) in India, showed that the consumption of assorted indigenous foods had been associated with a higher consumption of protein, fibre, iron, calcium, riboflavin, thiamine, and vitamin A. Studies in Africa highlighted the significance of indigenous foods, specifically vegetables that are rich in nutrients such as calcium, potassium, carotenoids, zinc, and magnesium, to name a few.

In Botswana, traditional diets are slowly being replaced by westernised diets that are high in sugar and low in nutrients. A study conducted by Kasimba et al. (2018:1201) in Botswana, also showed that consumption of traditional and

indigenous food provided a high percentage of energy intake in children (41 per cent) and women (36 per cent). It also had a higher vitamin A and zinc intake compared to non-traditional foods. Kasamba et al., (2019:282) stated that if people in Botswana continue to consume westernised foods it would create a greater threat of poor nutrition and micronutrient deficiencies in Botswana. Yet, the potential of indigenous foods and its impact on specific dietary nutrient intake remains unexplored in Botswana.

As mentioned, there are various countries around the world that have proved that indigenous foods hold a high amount of nutrients that are good for the body, and help alleviate malnutrition. A list of various indigenous foods from around the world, and the benefits they hold, follows:

- *Bunya nut*: This nut is part of the culture of Australian Aborigines, holding such high significance that Aboriginal people would travel far to attend various festivals that celebrate the Bunya season. The bunya nut is very similar to a chestnut, both in taste and appearance. It is highly nutritious nut, rich in protein, which can be roasted over a fire, used in soups, desserts, or in pesto (Gartrell, 2017:262).

- *Enset*: This plant is native to the tropical regions of Africa, it is also known as the false banana. The enset tree looks like a banana tree, but the fruit that it bears is inedible; however, the pulp inside its trunk and roots are edible, and have the appearance and taste of potato. It has a high carbohydrate and mineral content, but limited protein content. In Ethiopia, enset has been a staple crop for thousands of years (Jones & Daniells, 2019:26).

- *Hinkelhatz pepper*: This pepper had been grown by the Pennsylvania Dutch since the 1880s. The peppers are heart shaped, red or yellow in colour, with a stocky, spicy flavour. The pepper is deemed important due to it being cold tolerant, pest and disease resistant, and growing prolifically (EcoWatch, 2020).

- *Malselvnepe turnip*: This turnip has a strong and distinct taste. Throughout the years this root vegetable has been improved through selective cultivation in Norway. This turnip is versatile as it can be eaten raw, baked, roasted, or

boiled, and is often used to enhance flavours of dishes. It is an excellent source of potassium and vitamin C (Javed, Waseem & Amnad, 2019:142).

- *Okra*: Also known as ladies fingers, is commonly used in Indian and Pakistani cuisine. Most parts of the plant (flowers, seeds, stems) are edible and nutritious; seeds provide good quality protein and oil. Okra was found to help prevent diseases such as cancer, diabetes, cholesterol, and osteoporosis (Habtamu, Negussie, Gulelat, Woldegiorgis & Fekadu, 2015:21).

- *Perinaldo artichokes:* This vegetable is native to the Mediterranean region, having been originally cultivated in ancient Greece. These plants can bear cold temperatures and drought. These artichokes are known for their tasty centre and believed to have health benefits such as lowering blood sugar levels, enhancing heart and liver health, and improving digestion. The edible flower bud is full of nutrients such as folic acid, various minerals, vitamin C, and fibre (Guillen, Mir-Bel, Cria & Salvador, 2017:211).

A list of various South African indigenous foods, with their nutritional value and health benefits, follow:

- *Cowpeas*: Also known as *akkerboontjie* or *mbumba* are a cheap source of dietary protein, providing 50 to 70 grams of protein from between 170 and 200 grams of cow peas. It also contains nutrients such as iron, zinc, calcium, fibre, and antioxidants (American Society of Agronomy, 2016). Cowpeas provide food for livestock and are an important rotation crop as it improves soil fertility. With South Africa going through intense climate change, it has great possibilities to contribute to food security and poverty reduction in Africa (Shargie, 2016:1).

- *Baobab*: Also known as *isimuku*, is used as a source of potassium and calcium, and for treating dehydration. It has a high vitamin C and antioxidant content, traditionally used to keep skin youthful and hydrated. Other benefits include healthy blood pressure, controlled blood sugar, and reduced risk of strokes (Simoloka, 2016).

- *African spinach*: A traditional African leafy plant, also called *thepe,* is rich in protein and contains iron, calcium, vitamin A and vitamin C. Consumption of African spinach was found to lower the risk of vascular related chronic diseases and type 2 diabetes (Davidson, Ojukwu & Anyaogu, 2017:107; Van der Walt, Loots, Ibrahim, & Bezuidenhout, 2009:444).

- *Sorghum*: This grain is also called *mabele*, and is high in fibre, antioxidants, and magnesium, which aid in combating diabetes, relaxing nerves, maintaining a strong skeletal system and easing stress and anxiety. According to Simoloka (2016), sorghum was traditionally eaten as an unprocessed whole grain, in its natural form, as this was the only way to maintain all its health properties.

- *Cocoyam*: Also known as *amadumbe*, are produced primarily in Mpumalanga and KwaZulu-Natal, but can be in the majority of the provinces in South Africa. Cocoyams contain a wide variety of vitamins and minerals, and are an excellent source of dietary fibre that aids digestion. It helps to control diabetes as they regulate the release of insulin and glucose in the body. It contains vitamin A and E, which helps with healthy skin. Lastly, it helps with blood pressure and general heart health, due to the considerable levels of potassium, by relieving stress and pressure on veins. Cocoyam's grow fast under almost any conditions and do not cost much to cultivate (Akujobi, 2018:34).

- *Bambara groundnut*: Also known as *ditloo morpa* is a type of legume that appears in many traditional African dishes. They are rich in protein, vitamin B, and fibre. These nuts are beneficial in preventing cancer, heart disease, and thyroid disorders, among others (Akanji, Fasina, & Ogungbesan 2016:21).

- *Cassava*: This is a crop cultivated in Limpopo, Mpumalanga, and KwaZulu-Natal, and is also known as *unjumbula*. This plant is used as a substitute for rice or maize and in South Africa it is used primarily for the production of starch (Davidson, Ene-Obong & Chinma, 2017:11). Cassava contains significant amounts of calcium, phosphorus, and vitamin C; however, is low

in protein and other nutrients (Penido, Pilo, Sandes, Nunes, Colen, Oliveira, Rosa, & Lacerda, 2018:830).

- *Blackjack*: This plant grows as a weed, and is also called *umhlabangubo*. It was one of the most widely used foods providing nutrients similar to most leafy green vegetables, such as beta-carotene and vitamin E. It is known to reduce and relieve sexually transmitted diseases, malaria, and urinary tract infections (Moyo, Ngulube & Kazembe, 2016:141).

- *Pearl millet*: Also known as *amabele*, this grain is produced in KwaZulu-Natal, Limpopo, and the Free State province. Pearl millet is used whole, cracked, ground as flour, or as a grain like rice. It is also known to be grown for hay production (Samuel & Peerkhan, 2020:3469). The crop is drought and heat tolerant and grows in leached, acid, sandy soil. It has a high level of dietary fibre and a balanced amino acid profile and contains iron and zinc (Shivhare & Lata, 2019:38).

Various strategies can be put into place to create public awareness and increase consumer knowledge on the benefits of a healthy, balanced diet, which will eventually lead to sustainable behaviour changes that will increase the demand for more local nutritious food including indigenous vegetables. In the modern age, changing diet is difficult but not impossible. A study conducted by Rahim, Alam, Malek, Fakir, Anwar, Mokter & Islam (2013:200), showed the success of Moringa, a seasonal vegetable in Bangladesh and the Philippines, which is sold throughout the year in many markets and is found to be a highly nutritious and valued vegetable.

2.7 FOOD STORAGE METHODS

South Africa has a diverse range of food produce and knowledge on systems for preservation and storage passed down by elders. By storing and preserving food, households make sure that they secure food without threatening future consumption (Okoye & Oni, 2017:82).

People who deal with and are accustomed to indigenous foods crops know how to cultivate and prepare them. Many of these crops are found to be drought resistant, do not require expensive methods to produce, and have good storage qualities.

Indigenous people have methods of storing these crops, but over the years these methods had been lost (Rehman, Ali K, Ali W, Waqar, Muhammad, Abdul & Ullah, 2019:18; Thamaga-Chitja, Hendriks, Ortman & Green, 2004:11). Proper storage for indigenous foods plays an important part in local and home food supply, and most importantly maintains the seed quality and health of indigenous foods (Okoye & Oni, 2017:81). The decline in quality, quantity, and germination potential of seeds in storage can be caused by insect pests, thus proper storage procedures are incredibly important. Having indigenous foods safely stored is imperative because farmers can improve their incomes by selling them at premium prices when demand overtakes supply (Olakojo & Akinlosotu, 2004:363). There are many ways in which indigenous plants can be stored, but in most cases it needs to go through processing methods to preserve it before storing. Sneeze wood (*Ptaeroxylin Obliguum*) is used to store grain in Kenya. The leaves and bark are used when storing maize and the branches are used when storing unshelled maize.

The bark of the tree is burnt, and the ash is then mixed with grains as a pest repellent and the smoke from burning the wood repels insects during the storage of maize. This preservation practice has been used for a long time and is still common with farmers. Leaves are also burnt to ash and used to preserve grains (Chirimuuta & Mapolisa, 2011: 55).

Dry gum tree leaves are placed between layers of grain to prevent weevils. A study carried out in Uganda showed 77 per cent of households controlled pests such as stem borers and cabbage diamondback moths with locally made pesticides comprising red peppers, banana juice, citrus lemon leaves, neem tree, and tobacco. Approximately five per cent of households interviewed used synthetic pesticides; however, they found it costly to buy and these pesticides sometimes ruined the crop itself (Okoye & Oni, 2017:82). Traditional storage structures, silos made from mud and twigs are cheap to build but are not airtight, which leads to maize being exposed to harsh environmental conditions such as rain and sunlight (Gueye, Goergen, Ndiaye, Asiedu, Watheiet, Lognay & Seck, 2013:42).

In Malawi, the *msanja* is used; a wooden structure that is constructed above the fireplace and used as storage for grains like sorghum, maize, millet, and a variety of peas. This storage method protected it from weevils and other pests. It was cheap

to make and a good way to ensure food security (Kamwendo & Kamwendo, 2014:103).

In Nigeria, yams are stored in barns made from vertical poles cut from the bush. They are built on open ground but are shaded to protect the yams from the heat of the sun. This storage is good in the dry season and can be stored for six months; however, in the rainy season they deteriorate quickly (Ezeike, 1995:7; Ijatuyi, Mabe & Olusola, 2017:82).

There are many other indigenous methods of food storage such as storing potatoes and cocoyam's in soil to prevent spoilage (Akanji et al., 2016:65). In Nigeria and other countries across Africa, many traditional methods are used for sweet potato storage such as in ground storage, heap storage, platform storage, and pit storage. The most common method used traditionally in rural communities is pit storage, as it is cheap and does not require many materials (Awojobi, 2004:86).

In many countries across Africa, the majority of indigenous foods produced are processed with the use of simple indigenous knowledge and practices. Women primarily use these techniques to provide income and employment; however, the changing socio-economic status of women and the influence of western culture have negatively affected the knowledge of indigenous methods (Onoh, Echetama, Ugwoke & Ekwugha, 2012:1320).

The link between storage and preparation of food is incredibly important. While most indigenous foods can be prepared once they have grown, some need to go through processing and be stored. Incorrect storage can lead to problems such as pests and rodents. In the past, communities had to process foods and store them in case of an emergency or for future use; this was important because, if stored properly, they would preserve the nutrients most foods hold.

2.8 FOOD PREPARATION METHODS

Ever since the first human beings picked up cutting and mashing stones, food preparation has become a constant chore. Techniques such as sifting, drying, grinding, fermenting, salting, sealing, and applying heat are all extremely ancient methods. In recent years, these preparation techniques have evolved overtime with

more modern methods coming into play (Kakde, Bhopal, Bhardwaj & Misra, 2017:217). The processes of food preparation can be divided into three, physical (extracting nuts from their shells), chemical (adding spices), and biological (method or process of making). If foods are not properly prepared, they could be toxic, or inedible until softened. The preparation processes can bring together nutritional variety or have negative impacts on the nutrients (Jarvis, O'Bryan, Dawoud, Park, Kwon, Crandall & Ricke, 2016:283). Indigenous foods have been and still are a food source filled with rich micronutrients that most modern-day foods do not contain; however, food preparations and processing methods used affect the nutrients they hold.

Indigenous food crops have a large number of uses, for instance shoots, corns, and leaves can be used as accompaniments or in soups. Immature pods are boiled or dried, while most immature seeds are ground into flour. Fruit type crops can be processed into jam, jelly or juice (Agribook Digital, 2020).

Research has focused a lot on the production of indigenous foods as they are high in nutrients, but have failed to see which preparation methods would sustain most or all of the nutrients in such foods. The way in which food is processed helps preserve the nutrients it holds (Hotz & Gibson, 2007:1098).

Indigenous vegetables such as nightshade, Jews mellow, amaranth, and cowpeas, to name a few, are valuable sources of micronutrients, fibre, antioxidants, and iron. Methods such as boiling, stir-frying, and open sun drying were some of the most used methods for preservation and cooking of the above-mentioned vegetables (Oluoch et al., 2017:236). According to Oluoch et al. (2017:238), the best way to prepare indigenous vegetables to preserve micronutrients is to have a short cooking time, to add vegetables to boiling water rather than to cold water, using as little water as possible when boiling vegetables, covering vegetables while cooking, and parboiling vegetables before frying.

According to Gunathilake, Ranaweera and Rupasinghe (2018:117), each cooking method can retain some nutrients but will destroy others. There is no guarantee that every nutrient a vegetable holds will be there after preparation. As mentioned, food preparation is done mostly by women, among the other countless tasks they had;

women carried the water, fetched the firewood, and made and tended the fire. The pots and ovens were made from clay and placed on or used a fire made of wood to cook foods. Cooking over an open fire was a common cooking method, in which meat, vegetables, and various food items were tied to a stick and rotated by hand over a fire; today this is called a “motorised spit” (Simatende, Gadaga, Nkambule & Siwela, 2015:123). Clay pots were also sealed tightly and placed in clay ovens for several hours or buried in the ground underneath hot coals. The clay ovens today have been modernised into pizza ovens (Krebs, Cavazos & Campbell, 2019:413).

In modern times, many new food preparation methods are used, and old methods improved. Methods such as stewing and pressure cooking are some of the new common methods used, each with their advantages and disadvantages. The various methods of cooking used for indigenous foods are described in sections 2.8.1 to 2.8.5.

2.8.1 Boiling and simmering

Boiling and simmering is a safe and simple method, often used for large scale cooking. Vegetables are high in vitamin C, but a large amount is lost when cooked in water; boiling and simmering require sufficient water to cover vegetables (Musotsi, Abukutsa-Onyango & Makokha, 2017:36; Yuan, Sun, Yuan, Wang, 2009:580). Having food covered in water can cause the loss of water-soluble nutrients, but it can be salvaged if the water is used to make gravy. Over boiling food could ruin it completely, for example, green beans boiled for five minutes are tasty, but when boiled for 15 minutes they can turn to pulp (Igoumenidis, Iosifidis, Lopez-Quiroga, Bakalis & Karanthanos, 2019:2866). This method is simple; however, the length of time each food requires needs to be known to save as many of the nutrients possible.

2.8.2 Microwaving

Microwaving is one of the simplest, most convenient, and safest methods of cooking. Due to microwaving having a short cooking time it reduces the exposure of food to heat thus preserving the nutrients. Between 20 and 30 per cent of vitamin C in green vegetables is lost during microwaving, which is far less than most cooking methods (Sun, Bai, Zhuang, 2014:3362).

2.8.3 Roasting

Roasting food has been done for centuries over a wood fire with food attached to a stick and rotated. Roasting prevents moisture from being cooked out of the food while creating a crispy brown crust on the outside. The benefit of roasting is that there is little loss of nutrients and food has a good taste and appearance. Slow roasting brings out the flavour of meats and does not overcook vegetables. The juices from roasting can be used to make gravy. The disadvantages include long cooking time and the possibility of overcooking foods (Zhang, Wang, Pan, Chengli, Chen, Hui & Zheng, 2019)

2.8.4 Sautéing and stir-frying

This method uses medium to high heat with a small amount of oil or butter. Cooking for a short time without water can prevent the loss of vitamin B, while adding fat improves the absorption of antioxidants. Although this method improves the absorption of fat-soluble vitamins, it decreases vitamin C in vegetables (Ghavami, Coward, Bluck, 2012:1351).

2.8.5 Steaming

Steaming has always been known as the healthier cooking option, and is one of the best cooking methods for preserving nutrients, especially water-soluble vitamins that are sensitive to heat and water.

2.9 FREQUENCY OF FOOD CONSUMPTION

Before understanding indigenous food consumption, the original consumers need to be identified along with the effects of indigenous foods and their food systems. In 2007, the United Nations declaration on the rights of indigenous people was adopted, an important time where indigenous people and their rights were acknowledged (Kuhnlein, Eme & De Larrinoa, 2018:66). The number of indigenous people in the world remains unknown, as some stay hidden while some countries are still in the process of recognising indigenous people

An indigenous foods system can be described as “All food within a particular culture available from local natural resources and culturally accepted. It also includes the

socio-cultural meanings, processing techniques, use, composition, and nutritional consequences for the people using the food" (Kuhnlein et al., 2018:66). These systems are in place to ensure that the natural resource base of the indigenous people and not exhausted or diminished. Indigenous foods systems can influence a change in the current food system thinking. Although indigenous foods can grow in soils with low fertility and in areas of reduced rainfall and increased temperatures, most foods consumed in indigenous foods systems are not cultivated but rather harvested or hunted; therefore, the consumption patterns depend on seasonality and availability. The exploitation of indigenous foods result in exhaustion of the source and in time disappearance of indigenous foods. Indigenous people consider this bad practice, which holds negative spiritual auras for the community. Indigenous foods systems focus on the quality and utilisation of foods rather than on production quantities (Smith, Tuck & Yang, 2018:238).

A perception is defined as the process of knowing, it is based on a person's attitude and belief that have been sculpted by the sum of their life experiences. It is a person's understanding of information about a specific product that has attained a high level of significance in the mind of the consumer (Cloete & Idsardi, 2013:904). It was common knowledge that traditional indigenous foods was known as a poor person's food found mostly within rural areas where they depended on such food. The indigenous foods could be found in the bush, or be home grown, and were freely available. There were always large quantities, which was convenient for the people. Over time, the links between food and territory had crumbled due to changes in food production, transportation technologies, urbanisation, and consumer exposure to non-local experiences through travel and media (Legwaila, Mojeremane, Madisa, Mmolotsi & Rampart, 2011:173). Indigenous foods is recognised as "old-fashioned food" because it was prepared and consumed by the older generation, as they have the skills and knowledge of indigenous foods. The younger generation has a large range of food purchasing and consumption patterns, and a preference for modern convenient foods (Gewa, Onyango, Angano, Stabile, Komwa, Thomas & Krall, 2019:2958).

Everyday people and animals consume various types of food, which is affected by many factors:

- *Food availability*: Sufficient quantities of food are available on a consistent basis, supplied through domestic production or imports. Food availability is determined by food production and food trade. The need for food is unquestionable populations grow and with that food security has become a challenge. Food availability can be affected in various ways, economic, such as cost and income; social, like culture, family, peers, and mental problems, and physical, such as access, education, time, and skills like cooking (Oexle, Barnes, Blake, Bell & Liese, 2015:229).

- *Food accessibility*: Food affordability, allocation, and preferences allow people to change hunger into demand; healthy food can be sourced at a manageable distance using convenient and affordable transportation. Many rural areas and some city neighbourhoods have no access to affordable and healthy food sources. Food stores that sell indigenous foods or other healthy foods in rural areas and areas with little or no access could be a strategy to address accessibility (Ishikawa, Yokoyama, Nakaya, Fukuda, Takemi, Kusama, Yoshiike, Nozue, Yoshiba & Murayama, 2016:910).

- *Food choice*: People choose what they want to buy and eat. Each person has a different method of choosing food, and the factors around them play a part in their choice. This could be based on heritage, upbringing, price, personal preference, or medical reasons such as allergies (Gutjar, De Graaf, Kooijman, De Wijk, Nys, Ter Horst & Jager, 2015:221; Monteleone, Spinelli, Dinnella, Endrizzi, Laureati, Pagliarini, Sinesio, Gaperi, Torri, Aprea & Bailetti, 2017:123).

Food availability, food accessibility, and food choice are all influenced by geography, demography, disposable income, socio-economic status, urbanisation, globalisation, marketing, religion, culture, and consumer attitudes. All the influencing factors have caused changes in the Kenyan consumption habits. Different types of indigenous vegetables had been consumed in Kenya but when more exotic, modern vegetables became available, along with other foods, people changed their eating habits leading to the neglect of indigenous foods (Musotsi, et al., 2017:31).

Food consumption can be looked at in many ways. Food means family, survival, and culture, whether one is living in a developed or developing country or in an economically rich or poor household. Even though food consumption has such a high political, cultural, and economic association, it is largely overlooked. Food consumption patterns and new trends have a huge influence on food production patterns and on overall food security. A growing population, increasing urbanisation and rising incomes have elevated the need for resource intensive foods. The rise in population in both developed and developing countries has created a large increase in global food prices (Ajzen, 2015:134). The demand for cash crops and modern food has affected the growing of crops, as the land is degraded, soils are depleted due to unsustainable agriculture production methods and the effects of climate change. Farmers that own land within rural areas have stopped growing indigenous foods or have limited the number of indigenous foods grown to make way for modernised cash crops. Because of the increase in population the demand for cash crops have become higher, which has a negative impact on rural farmers, who lack the resources required to grow crops (Vorley & Lancon, 2016:6). The need for local farmers in rural areas has decreased significantly, as modern methods of obtaining vegetables have come into place. Countries have introduced trade and some supermarkets have their own farms for fresh produce, thus cutting out the rural intermediary and leaving rural farmers to produce for smaller markets and for their communities with very little profit (Mottaleb, Kruseman & Erenstein, 2018:393). Rural communities had to choose; as much as indigenous foods was tastier and a healthier, they needed to survive and growing crops that the public wanted was easier to sell. This caused a change in the consumption of these foods within rural communities (Vorley & Lancon, 2016:14).

Understanding how food has changed over the years in rural, peri-urban, and urban areas highlights the effect on consumption. Although people in urban areas still consume indigenous foods such as African spinach, African cabbage, and Cassava, it is not always easy to obtain. This has affected the consumption of indigenous and other foods; from daily or weekly consumption, it has moved to monthly and seasonally (Cidro et al., 2015:35).

Efforts to promote the consumption of indigenous foods continue, because of not only the health and nutritional benefits, but also the environmental benefits.

Promoting these indigenous foods can enable changes in the eating habits of people around the world. Even though urbanisation has caused a huge change in the consumption patterns of indigenous foods in both rural and urban areas, showing just how important these foods are to create better lives can change consumption patterns (Musotsi et al., 2017:31).

2.10 INDIGENOUS FOODS CONSUMPTION PATTERNS IN AFRICA

The indigenous foods consumption patterns of South Africa, Kenya, Nigeria, and India is discussed in sub-section 2.10.1 to 2.10.4. Thereafter the four countries are compared in sub-section 2.10.5.

2.10.1 South Africa

In South Africa, food insecurity has become an uncontrollable issue; in urban areas, food security has decreased from 42 to 20.5 per cent. Of households in informal settlements, 60 per cent are food insecure (Rudolph, Kroll, Ruysenaar & Dlamini, 2012:9). Harmful health outcomes such as chronic disease, obesity, and mental health issues have been linked to adults suffering from food insecurity, while in children it leads to poor development and decreased academic ability (Naicker, Mathee & Teare, 2015:269). South Africa's high rate of food insecurity has caused an increase in the number of people who suffer from malnutrition. Malnutrition mainly affects the rural population in South Africa, as they do not have access to nutrient rich foods, and many nutrient deficiencies occur. One major nutritional problem is the vitamin A deficiency, but others may include lack of iron, zinc, and protein. These deficiencies cause problems such as diarrhoea, respiratory infections, anaemia, and a weak immune system (Fongar, Godecke & Qaim, 2019:1543; Wenhold, Annandale, Faber, & Hart, 2012:30). Labadarios, Steyn, Maunder, MacIntryre, Gericke, Swart, Huskisson, Dannhauser, Vorster, Nesmvuni and Nel (2005:533) showed that children in rural areas were in worse condition than those in urban areas. Even though South Africa is a wealthier country, compared to other African countries such as Kenya, the wealth is not equally distributed, as a large part of the South African population does not have access to land, therefore those in rural areas have to start relying on food from spaza shops. By comparison, the majority of Kenya's population owns the land and they are able to produce

enough food to feed their families and themselves even in times of poor harvest, due to the resilience of indigenous foods (Hango, 2003, cited in Steyn, Nel, Parker, Ayah and Mbithe, 2012:230).

According to Matenge, Van der Merwe, Kruger and De Beer (2011:29), the lack of indigenous foods is due to the urbanisation of South Africa; therefore, the knowledge of indigenous foods has been greatly reduced, especially in the younger generations. In addition, urbanisation has caused a decrease in indigenous foods, as farmers are provided with incentives to produce cash crops thus ultimately displacing indigenous foods and leading to the current shift in traditional food patterns (Bairagi, Mohanty, Baruah & Thi, 2020:1). This rapid change, especially in rural communities of South Africa has led to high rates of malnutrition and other non-communicable diseases (NCD).

In South Africa, indigenous foods were mostly found in the bush, in fields, and on farms; farmers who weren't knowledgeable about these plants would discard them as weeds or have them destroyed with herbicides (Nkosi, Mostert, Dzikiti & Ntuli, 2020:1568; Van der Hoeven, Osei, Greeff, Kruger, Faber, & Smuts, 2013:2). Accessibility of these foods is a major concern, farmers and researchers should be educated on the appearance of these indigenous foods.

As mentioned, knowledge of the preparation of indigenous foods is greatly reducing, especially in the younger generation. According to Matenge et al. (2011:29), knowledge of preparation methods was held in the minds of older generations. Women over the age of 60 had much knowledge of indigenous foods, as they were seen as the caretakers of their families. *Cleome gynandra*, also known as the spider flower is used as a leafy vegetable in South Africa. It was bitter, but the bitterness is removed or reduced by continuously changing the cooking water or by cooking it in milk (Mushaphi, Dannhauser, Walsh, Mbhenyane & Van Rooyen, 2017:106; Van Rensburg, Van Averbeke, Slabbert, Faber, Van Jaarsveld, Van Heerden, Wenhold, & Oelofse, 2007:320). The leaves of *Mamordica balsamina (Motangtang*) can be used as eye medication. *Physalis pyruviara (Sepatlapatla*) is used to treat pain or is eaten accompanied with the traditional '*pap*' (mielie-meal porridge) (Van der Hoeven et al., 2013:5).

According to a study conducted by Van der Hoeven et al., (2013:5), the knowledge of medical use and food preparation was widely present in the community that lived deep within the village where the study was conducted. Whereas communities that lived closer to urban areas were unfamiliar with the uses of the indigenous foods, and had consumed more common foods such as spinach, cabbage, and apples. The reason was a lack of exposure to the various indigenous foods (Van der Hoeven et al., 2013:2).

A study conducted by Ronquest-Ross, Vink and Sigge (2015:9), showed that food consumption changes in South African urban areas are characterised by sugar sweetened beverages, increased intake of processed foods, and decreased vegetable consumption. These food consumption changes have contributed to a number of non-communicable diseases and obesity. Rural communities have also had a shift in food consumption as local shops bring in processed foods and foods high in sugar that are cheaper, thus communities stray away from indigenous foods.

Indigenous foods should have more exposure in South African homes as these foods contains valuable nutrients, which help to prevent in many health problems. In addition, indigenous foods can help alleviate hunger, aid in food security and malnutrition, and diminish the possible occurrence of NCDs. Great pressure needs to be put on scientific evaluation and documentation of these indigenous foods before it is completely forgotten, especially by the youth (Van der Hoeven et al., 2013:2).

2.10.2 Kenya

Food security has become a leading problem across Africa, and with populations increasing there is a lot of competition for land and water resources; this also means that the demand for food continues to increase. Kenya's population is expected to increase to 55 million by 2020 (Ogello & Munguti, 2016:11332). According to the Kenya National Bureau of Statistics (KNBS, 2010:45), undernourishment in Kenya has been increasing over the years with declining food production and challenges of unequal food distribution. Almost one-third of the population is chronically undernourished. Over the years, the Kenyan government has strived to achieve national, household, as well as individual food security for the country but have had

minimum success (Ogello & Munguti, 2016:11335). With food production challenges increasing in Kenya, solutions to food insecurity and malnutrition need to bring about quick results in order to have food availability; this can be done by encouraging own food production, such as indigenous foods high in nutrition (Ogello & Munguti, 2016:11332).

Kenya is a country rich in culture, with many ethnic groups and rich sources of indigenous foods. These indigenous foods grow well, even during poor harvest seasons, and are capable of sustaining life, as it is organic and safe to consume (Gakabo & Jere, 2016:1268).

Within the western regions of Kenya, many small-scale farmers produce traditional foods using subsistence-farming methods, where families rely on these foods as a means of survival. Of the approximately 200 indigenous species of plant that were used by Kenyans as food in the past, most were either collected in the wild, semi-cultivated, or cultivated, but now many are either unknown or extinct (Kinyuru, Konyole, Kenji, Onyango, Owino, Owuo, Estambale, Friis & Roos, 2012:151; Mutsotsi et al., 2017:31).

According to Kinyuru et al. (2012:152) and Mutsotsi et al., (2017:35), the indigenous foods were usually prepared by the mother of the house, as she was familiar with the cooking methods used for indigenous foods. The man of the household had little to no knowledge of the preparation of these indigenous foods.

Indigenous foods in Kenya were not only consumed because of the nutritional value, but also due to the number of associated health benefits. The most common health benefits include increased levels of stored energy, better blood circulation, as well as prevention of stomach cramps, constipation, and bloating (Kinyuru et al., 2012). Despite the nutritional and health benefits, Kenyans are not consuming indigenous foods even with the decline of food production (Gogo, Opiyo, Ulrichs & Huyskens-Keil, 2017:39; Kinyuru et al., 2012:152).

According to Steyn et al. (2012:229) and Lemke and Delormier (2017:6), many people abandon the indigenous high fibre foods for modern-day high fat, added sugar and high sodium level foods, which in turn can lead to harmful effects on health and the contraction of non-communicable diseases.

Indigenous foods have the ability to sustain life, as they are organic and relatively safe to consume, with studies showing that indigenous African foods are a good source of high nutrients (Kinyuru et al., 2012:149). Therefore, the need to consume indigenous foods are very important not only to avoid their extinction, but also to help fight food insecurity and malnutrition.

2.10.3 Nigeria

The need for food is a top priority in Nigeria; therefore, the achievement of food security in this country is crucial to overcome poverty and malnutrition (Benson, Amare, Oyeyemi & Fadare, 2017:1). In Nigeria, the majority of people are food insecure due to the high poverty levels and the poor performance of the Nigerian agricultural system.

It is estimated that about 60 per cent of all deaths that occur among children aged below five years of age in developing countries, such as Nigeria, could be caused by malnutrition. In Nigeria, the rates of micronutrient deficiencies are high country wide, especially within the poorest households. These deficiencies take their toll on human health. To reduce this malnutrition and undernourishment, people need better access to nutrient rich diets, especially foods containing vitamin A and iron. Even though Nigerians eat a variety of food types, the consumption of nutrient dense foods is insufficient (Adepoju & Allen, 2019:394; Nwuneli, Robinson, Humphrey & Henson, 2014:3).

Historically, rural African communities have been gifted with knowledge on indigenous foods; however, today people fail to realise the value of this special knowledge that has been passed down through the generations (Okoye & Oni, 2017:75; Wole & Ayanbode, 2009:287). In Nigeria, rural women play a crucial role in the development of the country, not only contributing to the family and wage activities, but also partaking in the marketing and distribution of food items. With the indigenous knowledge rural women in Nigeria have gained through the years, they have been able to grow different food crops species, preserve seeds, domesticate and use wild edible plants, make traditional medication, manage their land, and take care of their family's health (Lawal, 2017:395). According to Ene-Obong, Sanusi, Udenta, Williams, Anigo, Chibuzo, Aliyu, Ekpe, and Davidson (2013:541) and Lawel

(2017:201), rural women would carefully collect fruit, leaves, and roots of indigenous plants, like the baobab tree, red sorrel leaves, and tigernut tubers to supplement agricultural grains such as millet or sorghum. Even though this may only provide part of the nutritional intake needed, it was enough to survive. The consumption patterns for Nigeria were related to the type of food grown or produced in different areas in the past. A study conducted by Ene-Obong et al. (2013) showed that the consumption patterns were related to the knowledge of the food's nutrition and overall health benefits; it also showed that yams and cassava was consumed daily by 70 per cent of the participants in the Southern region of Nigeria (Ene-Obong et al., 2013:542).

The foods that are produced in households significantly influence the nutrition security of the household (Ezeomah & Farag, 2016:60). The decline of indigenous foods could also be due to negative connotations associated with these foods, and the fact that much of the land is owned by the federal government of Nigeria.

2.10.4 India

In India, malnutrition and food insecurity is nothing new for the country. According to the Global Nutrition Report (2018:31), there are 46.6 million stunted children in India; nearly half of the mortality rate of children under five years of age is attributable to undernutrition (Singh, 2020:1). Malnutrition results in a loss of productivity, impaired cognitive development, and increases in long-term health care costs, which most people cannot afford (Soeters, Bozzetti, Cynober, Forbes, Shenkin & Sobotka, 2017:897; World Bank, 2006:10). Many farmlands in India have become infertile or unproductive due to excessive use of imbalanced fertilises as well as excessive use of a single fertiliser in an area. This has become a problem due to the high demand for introduced or modern crops. Another major problem was crops not adjusting to climate change (Kumar, Das, Shin & Patra, 2017:52; Sarkar, Dhumal, Panigrahi & Choudhary, 2015:98).

Tribal communities used indigenous foods for many reasons, such as consumption, medicinal purposes, and food processing. The Indian tribal environments offer rich natural foods that could be used to promote food security and health (Ghosh-Jerath et al., 2015:494; Kumar et al., 2017:2). The Indian tribes depend on agriculture for

their livelihood, but issues such as changing landscape and deforestation presents challenges to the maintenance of livelihoods (Ghosh-Jerath et al., 2015:494). Hundreds of indigenous foods such as insects, plants, and fungi are known to contain food value; however, the nutrient content of these plants are undocumented, and an assessment of their intake pattern is not available (Ghosh-Jerath et al., 2015:495).

Women in India are known to possess far more knowledge of indigenous foods than do men. In Dehradum, the local women are able to identify nothing less than 145 species of indigenous tree and their uses. Rural women use their indigenous knowledge in multiple areas such as health, agriculture, education, natural resource management, and cultural affairs (Ellena & Nongkynrih, 2017:2; Wole & Ayanbode, 2009:289). Even though women had much more knowledge of indigenous foods, both men and women would go in to the forests to collect firewood, honey, and leaves. The women often created a source of income from their homes, selling indigenous foods in wooden carts.

Grains are a primary staple food in India and are nutritionally rich. Indigenous grains and legumes most commonly used in Indian history are *urad* (*vigna mungo*), *mung* (*vigna radiata*), and *masoor* (*lens culinaris*). They contained high amounts of starch and proteins. The traditional preparation techniques used were fermentation, soaking, and cooking (Pandey, Chhonkar, Singh & Khumu, 2017:635). Most of the green leafy vegetables were able to soothe stomach cramps, manage pain and fever, as well as provide an overall improvement to health (Sarker et al., 2015: 98). According to Ghosh-Jerath et al. (2015), a leafy vegetable known as *beng saag* (frog leaves) was one of the most diverse medical plants, known to ease stomach cramps, relieve jaundice, regulate blood pressure, reduce blood sugar levels, and improve concentration levels. Papaya leaves were used in the treatment of fevers in children. The tuber *kariya haldi* (*curcuma caesia*), or the rare black turmeric, was used for treating chest pains.

It is important to identify these wild indigenous plants as they not only treat chronic diseases such as diabetes, obesity, and cardio-vascular disease, but also provide beneficial and essential nutrients such as vitamins, minerals, iron, and protein needed for bodily functioning (Faruque, Uddin, Barlow, Hu, Dong, Cai, Li & Hu,

2018:2; Vadivel, Stuetz, Scherbaum & Biesalski, 2011:937). It is important that indigenous wild plants that are free to be searched for be examined for their nutrient content and medicinal qualities, and become widely recognisable by appearance and used to treat disease. Through analysing these indigenous wild plants, alternative food sources would be discovered (Faruque et al., 2018:2; Vishwakarma & Dubey, 2011:555).

2.10.5 Comparison of the four countries

The four countries discussed all have something important in common. Besides the fact that each had similar preparation methods, or that women had the most knowledge, all four countries were developing countries. According to the Library of Congress (2017:1), a developing country is defined as a country in which the majority of the population has far less income and significantly weaker social indicators than the populations in high income countries, and lives on far less money than the population in highly industrialised countries.

Within the four countries, a common problem found were the loss of indigenous knowledge over the years. It was found that knowledge passed on from ancestors on the use and preparation of indigenous foods was not well documented, and very few villages still grew and used indigenous foods. One of the most commonly found problems on the loss of knowledge on indigenous foods were due to lack of interest in the knowledge given to the youth, as well as the increase in modern foods. Knowledge is lost through urbanisation where people move from city to city or when people are forced to move out of rural areas and have to adapt to new places. Most people change to a modern lifestyle with regard to cooking methods and living, thus forgetting indigenous foods and cooking methods.

The issue of food insecurity and malnutrition in all four countries was discussed; a large number of people, mostly children, are suffering from malnutrition. The foods provided, or the lack of food, did not provide sufficient nutrients resulting in many deficiencies. With vital nutrients missing from their diets and the resulting health issues, people cannot afford modern medicine or modern nutritional foods. Indigenous foods in all four countries have many medicinal properties, and

increasing their intake is important as it can increase food security and decrease malnutrition.

2.11 CONCEPTUAL FRAMEWORK

The literature review outlines the levels of indigenous foods knowledge and the consumption patterns. A conceptual framework was formed, as seen in Figure 2.1, based on this information. The conceptual framework shows the indigenous knowledge barriers, the importance of nutrients, preservation, and preparation of indigenous foods.

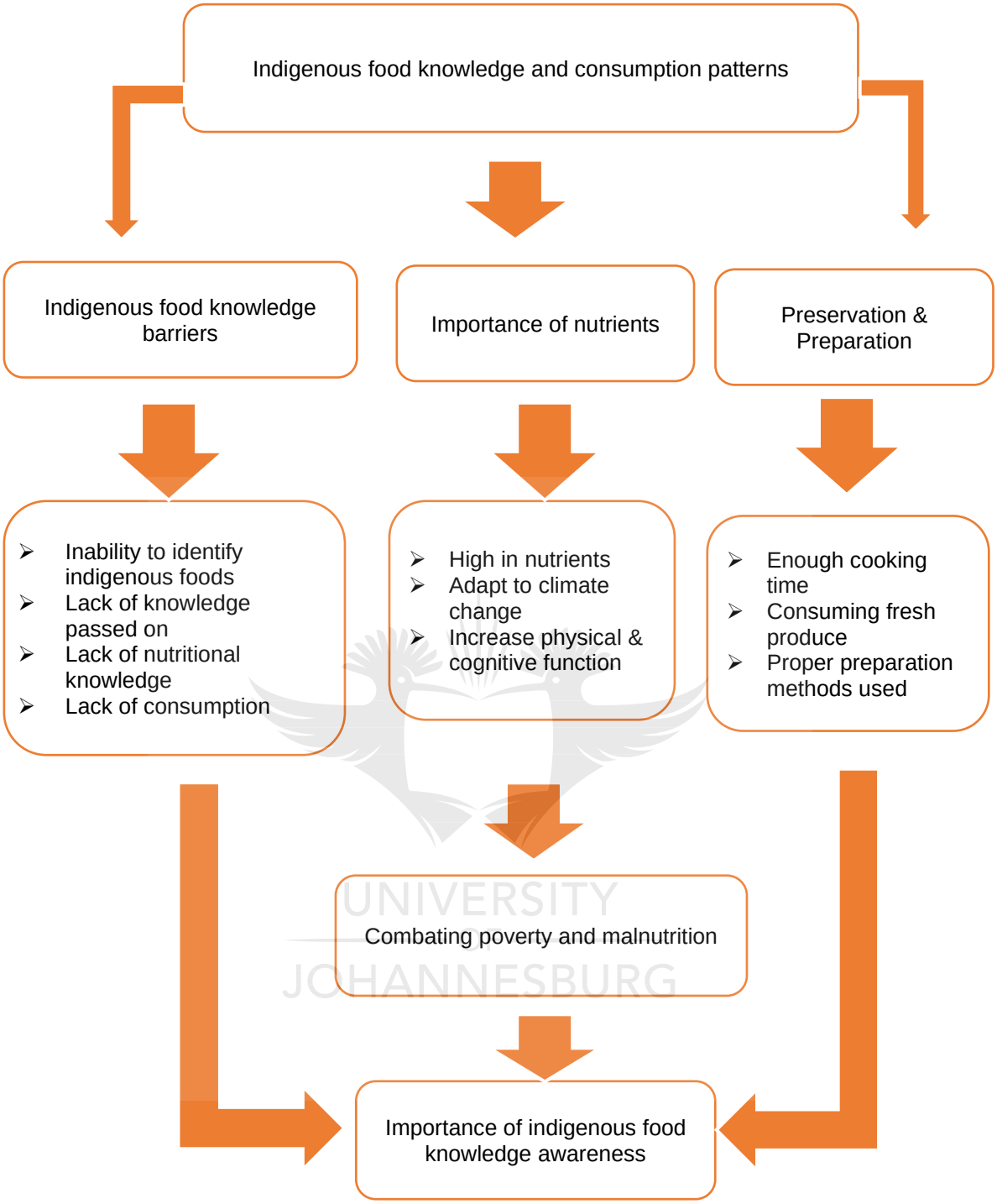


Figure 2.1: Conceptual Framework

(Source: Researcher's own construct)

2.12 SUMMARY

Indigenous foods have played an important part of people's lives for many years; however, as time progressed, the need for it has decreased. The elders hold the

knowledge in which the younger generation has little interest, creating a gap. Some residents in rural areas pass down knowledge on indigenous foods and some still grow such food, but with urbanisation the desirability has slowly disappeared, forcing farmers to grow cash crops according to the peoples wants. Hence, from consuming indigenous foods daily or weekly, people consume these foods monthly or seasonally and some do not consume them at all anymore. Some farmers grow these foods in rural areas so people can buy them from vendors in spaza shops. A few of the farmers sell their indigenous foods to local supermarkets. With the rate of poverty and malnutrition increasing, indigenous foods are slowly being brought to light again; the nutrients they hold can help to alleviate these problems.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research methods used to collect data for this study. It deals with the rationale for the chosen methodology, the area in which the study was conducted and the type and group of people on which the study focused. The methods that were used to maintain reliability and validity are also discussed; thus providing an in-depth analysis of the methodology. This chapter identifies the research approach used and the techniques followed through the chosen method. It provides a detailed guide on how the research was conducted from start to finish.

3.2 IDENTIFYING THE RESEARCH PROBLEM

In the past, indigenous foods were widely consumed throughout Africa for their nutritional value and to ensure food security (Manwa, Manwa, & Mahundi, 2018:341). In modern times, indigenous foods have become largely depreciated and are mostly farmed and consumed in rural communities through subsistence farming. This is due to the lack of publicity as a large number of modernised foods have been commercialised and are widely consumed (Dweba & Mearns, 2011:570; Manwa et al., 2018:342). Indigenous foods knowledge levels and the consumption of these foods have not been well researched. Although there is a lot of literature surrounding the nutrients that indigenous foods hold, there is little to no research showing why the growth of these foods has decreased over time or how these foods can be sourced. With South Africa's high malnutrition and poverty rates, there is a clear need to understand the lack of indigenous foods and the knowledge surrounding these foods within South Africa.

3.3 RESEARCH QUESTIONS

3.3.1 Main research question

- What are the indigenous foods knowledge levels and consumption patterns of peri-urban and rural residents in Johannesburg south?

3.3.2 Secondary research questions

- What are the knowledge levels of the residents in Johannesburg south on the various types of indigenous foods?
- What are the most commonly consumed indigenous foods and how frequently are these foods consumed (daily, weekly, monthly) by residents in Johannesburg south?
- What are the reasons for the consumption of indigenous foods, and in what manner are such foods sourced and prepared by residents in Johannesburg south?
- How do indigenous foods knowledge levels and consumption patterns of peri-urban and rural resident's in Johannesburg south compare?

3.4 RESEARCH DESIGN

A research design can be described as a "set of advance decisions that makes up the master plan specifying the methods and procedures for collecting and analysing information" (Turner, Cardinal & Burton, 2017:261). A descriptive research design was used for this study. According to Atmowardoyo (2018:198), descriptive research is defined as "a research method used to describe the existing phenomena as accurately as possible. Phenomena observed in descriptive research are already available. The main goal of descriptive research is to describe systematically the existing phenomena under the study".

3.4.1 Research approach

Research has two approaches, qualitative and quantitative. A qualitative approach is defined as primarily exploratory research (Burns & Bush, 2010:12), and uses focus groups, observations, and individual interviews to collect data from a small sample. A quantitative approach aims to quantify the problem by generating numerical data that could be transformed into useable statistics and uses structured questionnaires (Leavy, 2017:10).

A quantitative approach was used to collect data for this study. A quantitative study can be described as the use of multiple-choice questions, the answers to which are pre-determined and the most appropriate answer selected by respondents (Burns & Bush, 2010:10; Grove, 2018:191). A quantitative study uses analytical approaches that aim to prove, disprove, or lend acceptance to an existing theory. This method is most appropriate when the primary objective is to explain or evaluate a situation within a large group of people (Leavy, 2017:17), and to provide essential data that cannot be obtained from resources like books, journals and records. Within the quantitative approach, the study uses a descriptive design approach through self-administered questionnaires. This approach was used as it depicts the current status of a recognised variable (Seixas, Smith & Mitton, 2018:779) and allowed for the objectives of this research to be met by identifying the current knowledge levels and consumption patterns of indigenous foods by residents in Johannesburg south.

3.4.2 Research technique

The research technique used was field research; research that is not done in a laboratory setting (Crump, 2020:211). Questionnaires were distributed through a third party to residents from Soweto and Lenasia South areas. Lenasia South is a vibrant, growing, community filled with a mix of cultures. It was a predominantly Indian community, however, various cultures have bought houses within the area, and many have laid claim to the land and built smaller houses and shacks in and around the Lenasia area. People would claim land and create their own communities, thus creating peri-urban and rural living (SAHO, 2016). Soweto was created when the government started separating blacks from whites. Over time, Soweto became the largest black city in South Africa and is now one of South Africa's well-known tourist attractions, just like Lenasia South, Soweto is home to rural, peri-urban and urban living but the study focused mainly on the peri-urban and rural area (SAHO, 2019).

3.5 POPULATION AND SAMPLE

The participants chosen for this study were African black individuals residing in Johannesburg south, as they had been known to grow and consume the most indigenous foods (Baiphethi & Jacobs, 2009:461). Five cultures were chosen:

IsiZulu, IsiXhosa, Setswana, Sesotho, and Venda, as they focused on many of the people that lived within the areas of study. The areas in Johannesburg south included rural and peri-urban areas, thus providing a comparison of consumption patterns, and the reasons for any reduction in consumption. Rural areas were chosen as existing research stated that indigenous foods and knowledge levels were high; peri-urban areas were chosen to ascertain whether indigenous foods are consumed and if residents have had knowledge passed on to them.

The individuals' age, education and socio-economic status was recorded. An email from Statistics South Africa (Mashiane, 2018), provided the population sizes for each area in Johannesburg (Appendix A), from which the areas most suitable to conduct the research were chosen, these being Lenasia South and Soweto, representing both peri-urban and rural areas.

Sampling involves selecting a division of the population that suitably represents the entire group for data collection of the research (Burns & Bush, 2010:17; Etikan & Bala, 2017:149). The sampling technique used in this study was non-probability sampling, in which participants are selected based on their ability and willingness to participate. Within non-probability sampling, convenience sampling was chosen due to participants being in close proximately to each other, thus eliminating travel costs. Participants' availability was taken into consideration, as the research was conducted in public places within Johannesburg south, thus using the limited time available.

3.6 DATA COLLECTION AND ANALYSIS

3.6.1 Data Collect Instrument

The data was collected through the use of semi-structured questionnaires (Appendix B) that consist of two sections, section A being demographics of individuals, and section B based on the indigenous knowledge levels and consumption patterns of the participants. The questionnaire had been adapted from a previous study conducted in order to allow it to meet the objectives of this study. The questionnaire was created using Microsoft Word 2016.

3.6.2 Data Collection/Fieldwork

The questionnaire was handed out to people within the chosen areas. The researcher worked with trained fieldworkers who had been taken through each question in the questionnaire to understand every aspect of it. Most of the field workers were familiar with field work and were able to understand what was needed to be done. While working with different cultures, the trained workers had to translate the questionnaire for those participants who could not understand it especially in the rural area. This was to ensure that the questionnaires were completed correctly in total, 208 questionnaires were completed, 103 in peri-urban areas and 105 in rural areas.

The data collected in each questionnaire was sorted according to categories, which allowed an effective comparison between rural and peri-urban areas, and transcribed into either a graph or a comparison table. The focus was on the knowledge levels and consumption patterns of indigenous foods by respondents.

3.6.3 Data Analyses

The data was captured, and a statistical analysis was performed using SPSS, which analyses data and creates tables and graphs, using descriptive statistics.

A chi-Square test was performed by STATKON (Statistical Consultation Services) to determine if the difference between the two groups (peri-urban and rural) were significant. The chi-square statistic is used when a variable is measured at a categorical level (Connelly, 2019:127). A large difference between the observed and the expected values implies that the value of the chi-square will be large and the data will not support the null hypothesis. However, a small difference between the observed and expected values implies that the value of the chi-square will be small and the data will support the null hypothesis (Pandis, 2016:898). There had been a limited number of questions on the questionnaire that could be used to do a chi-square test.

3.7 CONCEPT MEASUREMENTS

A pilot study was conducted within Johannesburg south. The pilot study had been conducted in Ennerdale in a similar setting with the same cultural groups. The pilot study was done to identify any errors and clarity issues or concerns with the questions proposed. A thorough check was also done by the researcher's supervisor to eliminate any issues that may have arisen. This ensured that the final questionnaire would yield the correct answers based on the best understanding by the respondents. It is important to ensure that the research instruments will receive both accurate and consistent data; therefore, the measurements of reliability and validity are important.

3.7.1 Validity

Validity is defined as the accuracy of the measurement, the exactness of the measurement relative to what actually exists (Burns & Bush, 2010:32). To test the validity and reliability of the study, a pilot study was conducted to test whether the questionnaire was well suited for its purpose and whether it could measure the variables. It was ensured that all content in the questionnaire covered all objectives in the study, hence the data obtained from the questionnaire was considered valid.

3.7.2 Reliability

Reliability can be explained as obtaining identical or similar responses from the same respondent repeatedly (Burns & Bush, 2010:33; Taherdoost, 2016:33). In order to ensure the reliability of the questionnaire and the answers obtained a pilot study was conducted to test the questionnaire on a small scale to identify possible errors in the questionnaire before conducting research with the intended sample group. The pilot study eliminated errors such as spelling or legibility issues or concerns in the questionnaire. The pilot study was given to a group of people in Johannesburg, in an area excluded from the research. The answers provided in the pilot study met expectations, and clarified the target group as African blacks, as this was where most of the indigenous knowledge lay. To ensure reliability it was ensured that respondents resided within the chosen areas of study.

3.8 ETHICAL CONSIDERATIONS

Ethical considerations in research are vital. Ethics are defined as norms or standards for conduct that differentiate wrong from right, helping to decide between acceptable and unacceptable behaviours (Krajnovic & Dragicevic, 2017:393). It is important to conduct research in an ethical manner to prevent fabrication.

Ethics clearance was sought from the University of Johannesburg Institutional College of Business and Economics (CBE) Research and Ethics Committee. The ethics code is STH043 and the letter is attached in Appendix C.

3.8.1 Protection from harm

The research conducted should not bring any type of harm to participants such as distress, discomfort, social disadvantage, or harm to their financial status. It was ensured that every participant received an explanatory letter (Appendix D), along with the questionnaire, explaining the purpose of the study and assuring respondents that all answers were treated confidentially and with the utmost respect (Gravetter & Forzano, 2012:106).

3.8.2 Privacy and confidentiality

Another ethical consideration is ensuring that the privacy and confidentiality of research participants are protected. All questionnaires completed remained anonymous, as no names were collected and participants did not need to specify their addresses. The explanatory letter assured respondents of their anonymity, confidentiality, and privacy (Leedy & Ormrod, 2010:102).

3.9.3 Informed consent

It is important to obtain consent from participants before using any information provided. It was ensured that participants understood that they were taking part in research, the requirements of the research, the reason for the research, and that their anonymity was guaranteed. Participants provided verbal consent to complete the questionnaire (Gravetter & Forzano, 2012:109).

3.9 INCLUSION AND EXCLUSION CRITERIA

The inclusion criteria explain all the aspects that were included in the research study, and the exclusion criteria detail all aspects that were not part of the study.

3.9.1 Inclusion criteria

- Participants aged from 18 to over 56 years were selected to ensure that they properly understand the study. In addition, most residents of these ages had left their homes and have were living on their own.

- African black cultures, such as IsiZulu, IsiXhosa, Setswana, Sesotho, and Venda were included, as many people that lived within the areas of study were of these cultures.

- African black individuals were sought as extant research and the pilot study had shown that the majority of the people that had knowledge on indigenous foods were had been African black individuals.

- Peri-urban and rural areas were used specifically, as many people who had left rural areas, moved to peri-urban areas. These areas were compared to ascertain how people have changed and adapted to modern living.

3.9.2 Exclusion criteria

- Participants aged 18 years and under were excluded as these individuals are still living at home and do not possess as much knowledge as those over 18 years.

- Various ethnic groups and cultures, beyond what was specified in 3.9.1 were excluded, as the pilot study had shown that not many people outside these black African cultures knew about indigenous foods.

- Urban areas were excluded as most people living in urban areas had either grown up there or moved there from their parents' homes mostly in urban areas. Very few people move directly from rural to urban areas.

3.10 SUMMARY

A quantitative study was used for the research, and the sampling method was convenience sampling. A pilot study was completed to assist with the validity and reliability of the questionnaire. All ethical considerations were taken into account to assure participants that all information given would remain private and confidential.

CHAPTER FOUR
FINDINGS AND DISCUSSION

4.1 INTRODUCTION

This chapter includes the feedback and responses from 208 questionnaires completed in rural and peri-urban areas in both Lenasia South and Soweto. Analyses of all completed questionnaires are presented in table or graph format with a descriptive discussion. Chi square analyses were performed to show comparisons between variables

The results are presented in two sections, section A deals with the demographics of respondents focusing on the respondent's gender, age, ethnicity, highest qualification, to name a few. Section B focuses on indigenous foods knowledge levels and consumption patterns of residents in rural and peri-urban areas within Soweto and Lenasia South.

These results are then discussed in relation to the literature reviewed in Chapter 2. A brief summary closes the chapter.

4.2 SECTION A: DEMOGRAPHICS

The demographic profile comprised 208 respondents within rural and peri-urban areas in Lenasia South and Soweto. As shown in Table 4.1, the study comprised 208 completed questionnaires, the results of which are presented in detail in this section.

Table 4.1: Demographics profile of the respondents

Demographic (n=208)	Rural Frequency (n)	Percentage (%)	Peri-urban Frequency (n)	Percentage (%)
GENDER				
Male	48	23	56	27
Female	55	26	47	23
Missing	1	0.5	1	0.5
Total	104	50	104	50
AGE				
18-25	15	14	26	25
26-35	17	16	33	32
36-45	24	23	19	18
46-55	32	31	11	11
56+	17	16	14	14
Total	105	100	103	100
HIGHEST QUALIFICATION				
Grade 0-7	59	56	1	1
Grade 8-12	35	33	39	38
Tertiary Education	11	11	63	61
Total	105	100	103	100
AMOUNT OF PEOPLE IN HOUSEHOLD				
1-2	5	5	12	12
3-5	45	43	63	61
6 or more	55	52	28	27
Total	105	100	103	100
TOTAL HOUSEHOLD INCOME				
> R500 – R2 999	38	36	3	3
R3 000 – R4 999	26	25	11	11
R5 000 – R9 999	29	28	14	14
R10 000 – R14 999	10	9	26	24
R15 000 – R24 999	0	0	22	22
R25 000 – R55 000+	2	2	27	26
Total	105	100	103	100
CULTURE				
IsiZulu	33	31	32	32
IsiXhosa	24	24	19	18
Setswana	13	12	12	12
Sesotho	19	18	16	16
Venda	16	15	12	11
Other	0	0	12	11
Total	105	100	103	100
RESIDING AREA				
Lenasia South	49	47	53	52
Soweto	56	53	50	48
Total	105	100	103	100

The study consisted of both male and female; 23 per cent of the respondents were male and 26 per cent female in rural areas, and 27 per cent and 23 per cent were male and female respectively in peri-urban areas. This was very close to a 50 per cent split between genders for a good understanding of both.

The ages of the respondents was fairly distributed, with the age group 18 to 25 years had 14 per cent in rural areas and 25 per cent in peri-urban areas, and the age group 26 to 35 years had 16 per cent in rural areas and 32 per cent in peri-urban areas. Of the age group 36 to 45 years, 23 per cent were in rural areas and 18 per cent in peri-urban areas and the age group 46 to 55 years had 31 per cent in rural areas and 11 per cent in peri-urban areas. Lastly, participants aged 56 years and above had the lowest representation of 16 per cent in rural areas and 14 per cent in peri-urban areas.

The highest qualification level results show that only 11 per cent of respondents had a tertiary qualification in rural areas and 61 per cent in peri-urban areas. Participants with grades 8 to 12 represented 33 per cent in rural areas and 38 per cent in peri-urban areas and lastly those with Grades 0 to 7 represented 56 per cent in rural areas and 1 per cent in peri-urban areas.

The results of the number of people living in each household show a small number, five per cent in rural areas and 12 per cent in peri-urban areas, had one to two people in each household. Households with between three and five people represented 61 per cent of peri-urban responses and 43 per cent of rural responses. Lastly, households with more than six people represented 52 per cent of responses in rural areas and 27 per cent in peri-urban areas.

Within rural areas, the highest response rate to the household income questions was between R500 and R2 999 with 36 per cent of respondents in rural areas and three per cent in peri-urban areas. Those earning between R25 000 and R55 000+ was the highest household income in this research and represented two per cent in rural areas and 26 per cent in peri-urban areas.

The highest representation of culture was IsiZulu with 31 per cent for rural areas and 32 per cent for peri-urban areas. IsiXhosa comprised 24 percent of respondents in rural areas and 18 percent in peri-urban areas. Of the remaining cultures represented in the sample, Venda and Setswana were the lowest.

From the 208 respondents, 49 per cent resided in Lenasia South, of which 47 per cent were in rural Lenasia South and 52 per cent in peri-urban Lenasia South. There

were 51 per cent of respondents in Soweto, of which 53 per cent were in rural areas of Soweto and 48 per cent in peri-urban areas of Soweto.

Table 4.1 shows that rural areas had middle-aged to older people with lower income and education levels living in households with large numbers of members; whereas peri-urban areas had younger respondents with higher income and education levels. Age, income, and education could affect the difference in knowledge levels of indigenous foods between rural and peri-urban areas.

Rural people moving into peri-urban areas were exposed to a variety of new foods. Having higher education and income levels played a role as younger people tended to follow nutritional crazes seen on social media or that friends and family are following. People in rural areas did not have the means to sustain such lifestyles.

In peri-urban areas, despite a higher educational status, respondents lacked basic knowledge on South African indigenous food; it did not seem important to them as they focused on trends, as mentioned above. However, rural communities relied on the knowledge, passed down through generations, on indigenous foods and plants that are not only nutritious but also hold medicinal and other properties.

4.3 SECTION B: INDIGENOUS FOODS

Section B focuses on the knowledge levels respondents have on indigenous foods, the variety of indigenous foods consumed, and the reasons for their consumption. It also compares peri-urban and rural results.

4.3.1 Knowledge levels

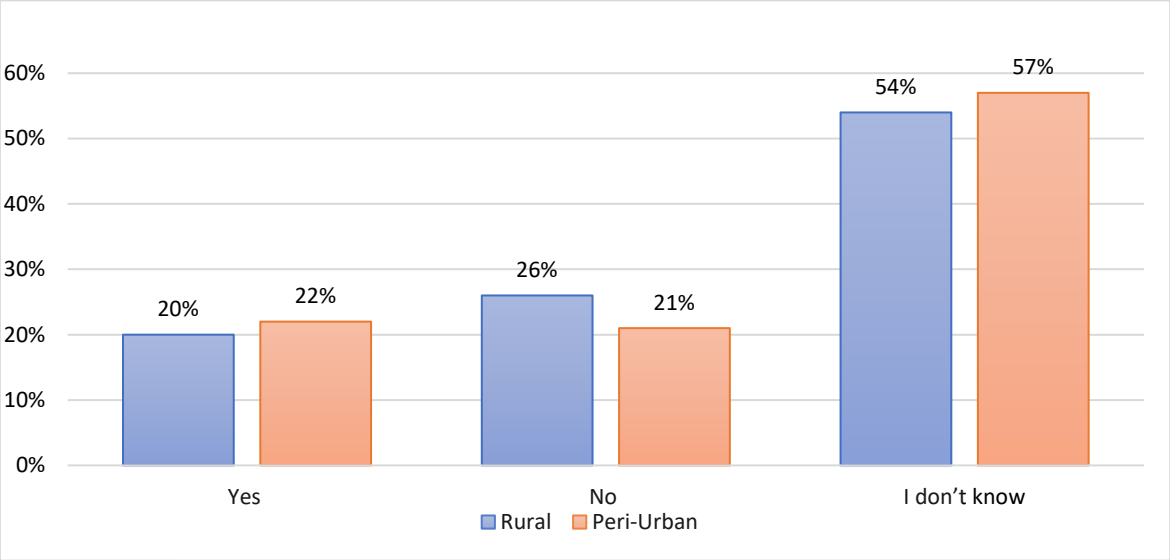


Figure 4.1: Does nutritional value decrease when indigenous foods are prepared?

In Figure 4.1, a large number of respondents in rural areas (54 per cent) and peri-urban areas (57 per cent) noted that they did not know if the nutritional value decreased when indigenous foods are prepared. Of respondents, 20 per cent in rural areas and 22 per cent of respondents in peri-urban areas had responded positively, meaning that they were aware that nutritional value decreased with preparation. This corresponds with the number of respondents who said they have good knowledge on the nutritional value indigenous foods hold, as seen in Figure 4.15. Of respondents, 26 per cent in rural areas and 21 per cent in peri-urban areas stated that they did not know if the nutritional value changed.

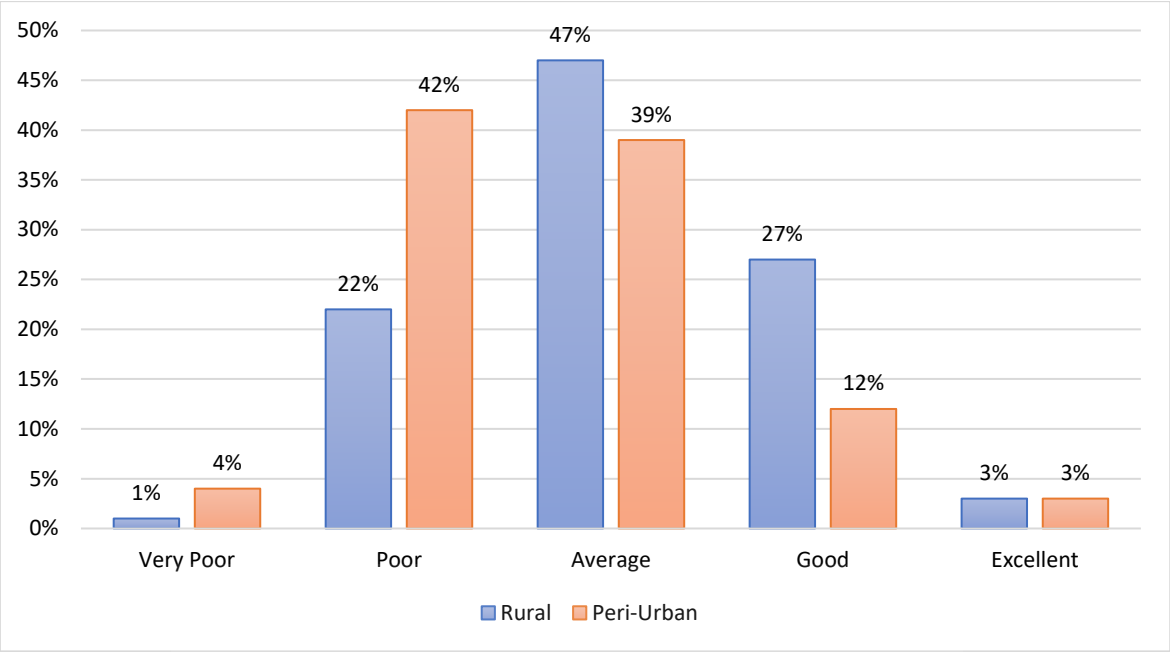


Figure 4.2: Knowledge levels on nutritional value of indigenous foods

Figure 4.2 shows the knowledge levels on the nutritional value of indigenous foods in rural and peri-urban areas. In rural areas, 47 per cent of the respondents chose average as the highest response, and 22 per cent chose poor. This was likely due to consuming the crops, as they were cheaper to produce, and not because of the nutritional value. In rural areas, 27 per cent of respondents noted good levels of nutritional knowledge, while 12 per cent of respondents from peri-urban areas noted good levels. Respondents explained that most of the knowledge about the foods had been passed on from older family members. Both areas each had three per cent of respondents who stated that their knowledge levels were excellent; all of these respondents were over the age of 50 years.

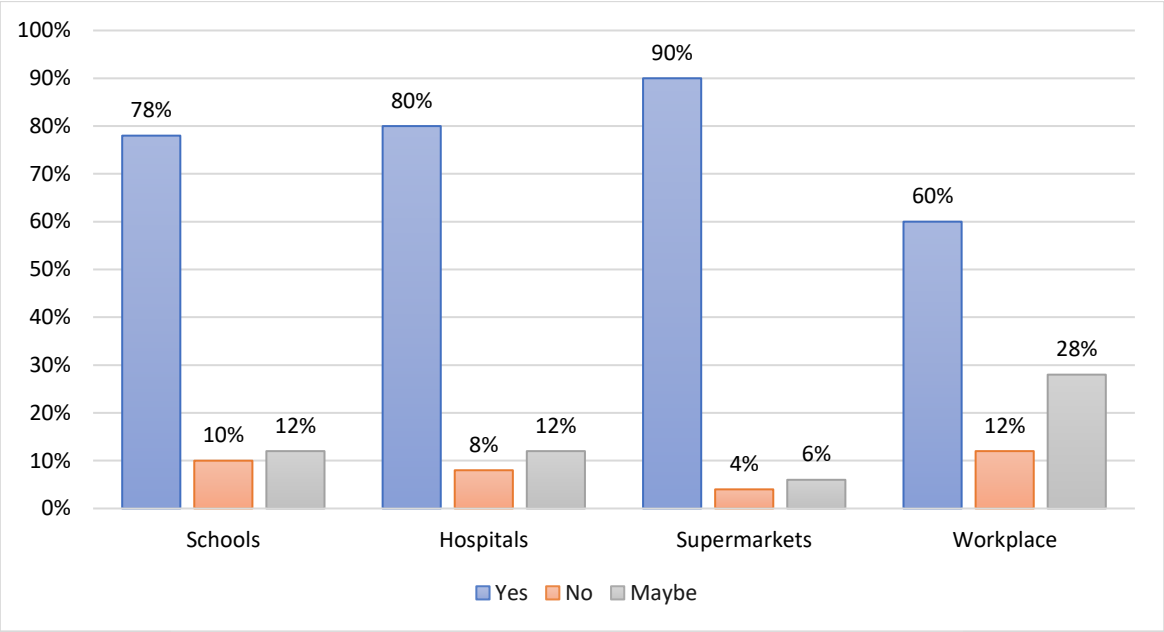


Figure 4.3: Where would you like to see more indigenous food?

Figure 4.3 illustrates where respondents would like to see indigenous foods more often. All the categories had a high positive response rate, with supermarkets having the highest response rate at 90 per cent of respondents wanting to see indigenous foods sold there more often, which, according to respondents, would make it easier for them to purchase. A large number of respondents wanted to see indigenous foods available at hospitals (80 per cent), schools (78 per cent) and the workplace (60 per cent). Having indigenous foods in schools that have feeding schemes would be beneficial to the students due to the nutritional properties they hold. The high positive response rate showed a great interest in consuming more indigenous foods.

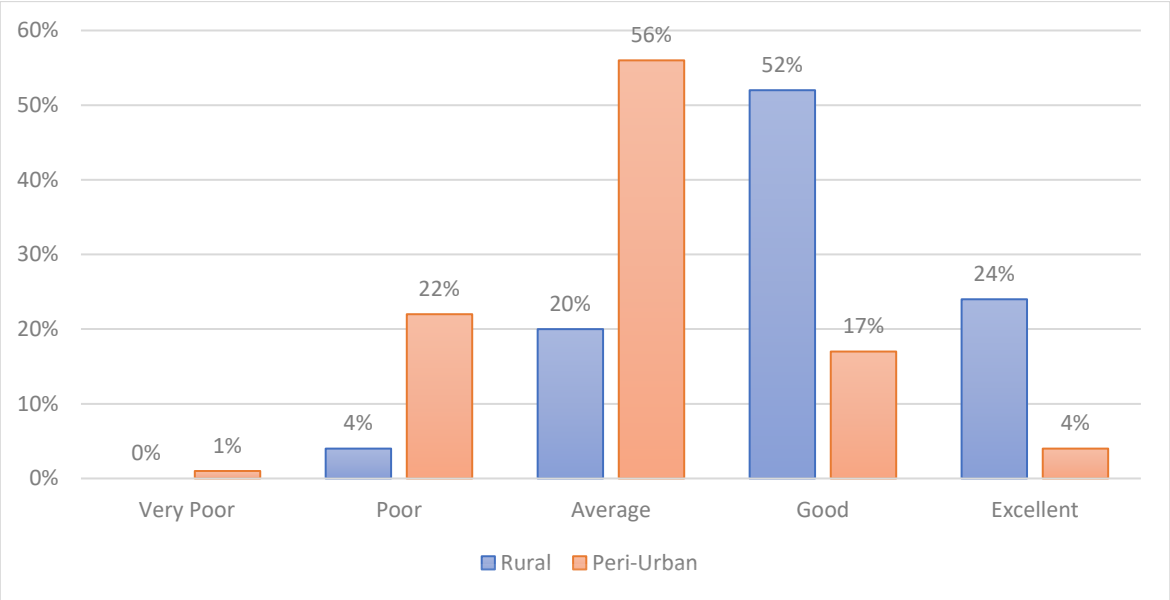


Figure 4.4: Ability to identify indigenous foods

Figure 4.4 shows that respondents in rural areas can identify indigenous foods more easily than respondents in peri-urban areas. Of respondents, 20 per cent in rural areas and 56 per cent in peri-urban areas rated themselves average at identifying indigenous foods; 22 per cent of respondents from peri-urban areas had chosen poor and only four per cent from rural areas rated themselves poor identifiers. For the 'good' rating, a high response rate of 52 per cent of respondents in rural areas, while only 17 per cent in peri-urban areas was noted. Of respondents in rural areas, 24 per cent rated themselves excellent at identifying indigenous foods, in contrast to only four per cent in s peri-urban areas. Figure 4.4 shows a gap between rural and peri-urban areas in being able to identify indigenous foods.

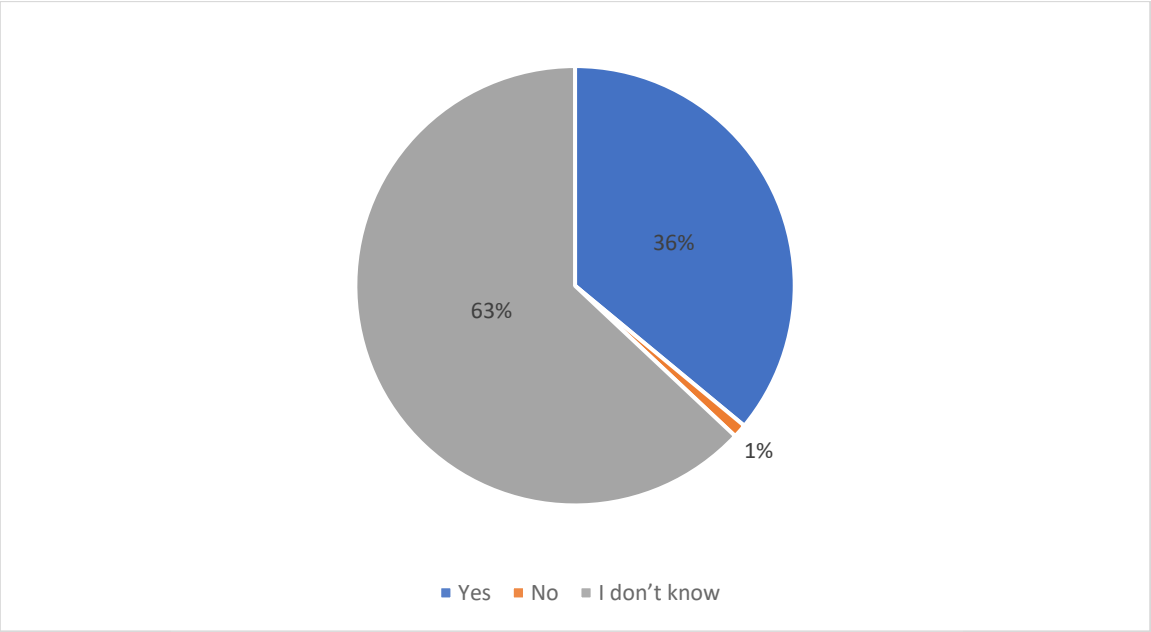
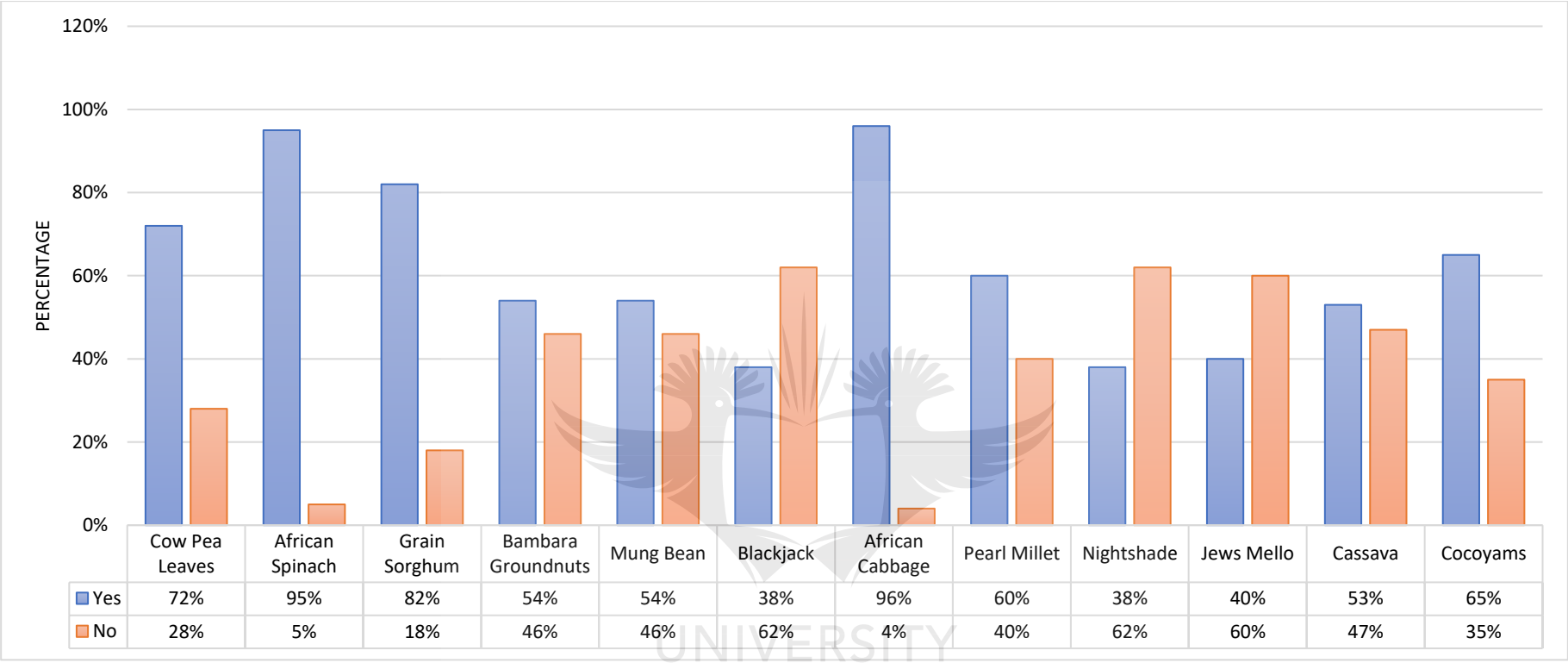


Figure 4.5: Can indigenous foods help food insecurity?

Figure 4.5 shows what respondents think about indigenous foods and whether it can aid food insecurity. Of respondents, 63 per cent said they were not sure, 36 per cent said yes, and one per cent said no. The respondents that said yes, expanded saying it can aid in food insecurity because it contains nutrients not many other foods have, making it better to consume. They stated that it was easier to produce being indigenous to the country. If more research and effort went into creating awareness of indigenous foods, this could aid in food insecurity and malnutrition.

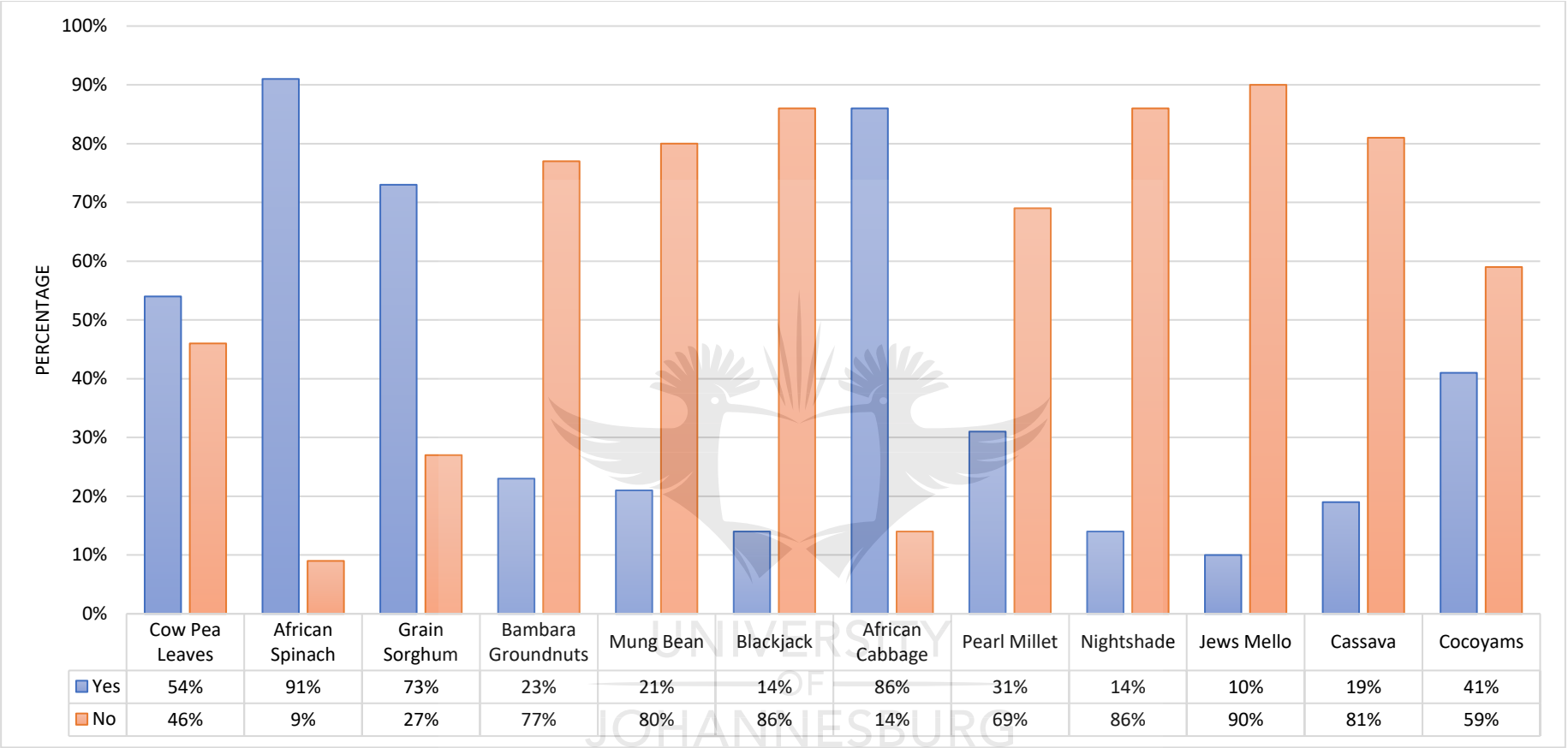
4.3.2 Common consumption

It is evident in Figure 4.6 that African spinach and African cabbage are the most consumed indigenous foods in rural areas. Of respondents, 95 per cent said they consumed African spinach, while only five per cent said no. African cabbage was consumed by 96 per cent of respondents in rural areas, while only four per cent said they did not consume this food. Foods such as blackjack (38 per cent) and nightshade (38 per cent) are the least consumed foods by respondents in rural areas.



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mung Bean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jews Mello	Cassava	Cocoyams
Yes	72%	95%	82%	54%	54%	38%	96%	60%	38%	40%	53%	65%
No	28%	5%	18%	46%	46%	62%	4%	40%	62%	60%	47%	35%

Figure 4.6: Consumption of crops in rural areas



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mung Bean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jews Mello	Cassava	Cocoyams
Yes	54%	91%	73%	23%	21%	14%	86%	31%	14%	10%	19%	41%
No	46%	9%	27%	77%	80%	86%	14%	69%	86%	90%	81%	59%

Figure 4.7: Consumption of crops in peri-urban areas

Figure 4.7 represents the consumption of crops in peri-urban areas. African spinach (91 per cent) and African cabbage (86 per cent) are the most consumed crops by respondents in peri-urban areas. Another crop that has a high consumption rate is grain sorghum at 73 per cent. Crops such as Jews mellow (10 per cent), blackjack (14 per cent), and nightshade (14 per cent) were not consumed much in peri-urban areas.

Comparing Figures 4.6 and 4.7, it is noted that African cabbage and African spinach was the most consumed crop in both rural and peri-urban areas. In rural areas (Figure 4.5) most crops had a high consumption rate, whereas in peri-urban areas (Figure 4.6) most crops had a low consumption rate. Even though certain crops have a low response rate, all the crops mentioned in the questionnaire are consumed by respondents in both rural and peri-urban areas.

Table 4.2: Chi Square tests for African spinach consumption

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.293[a]	1	0,256
Likelihood Ratio	1,294	1	0,255
Linear-by-Linear Association	1,286	1	0,257
N of Valid Cases	192		

Table 4.3: Chi Square tests for African cabbage consumption

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.083 [a]	1	0,014
Likelihood Ratio	6,233	1	0,013
Linear-by-Linear Association	6,050	1	0,014
N of Valid Cases	184		

Statistics for African spinach (Pearson $X^2 = 1.239$, d = 1, p = 0.256) in Table 4.2, and African cabbage (Pearson $X^2 = 6.083$, d = 1, p = 0.014) in Table 4.3 show that there was no significant difference of consumption within the two areas.

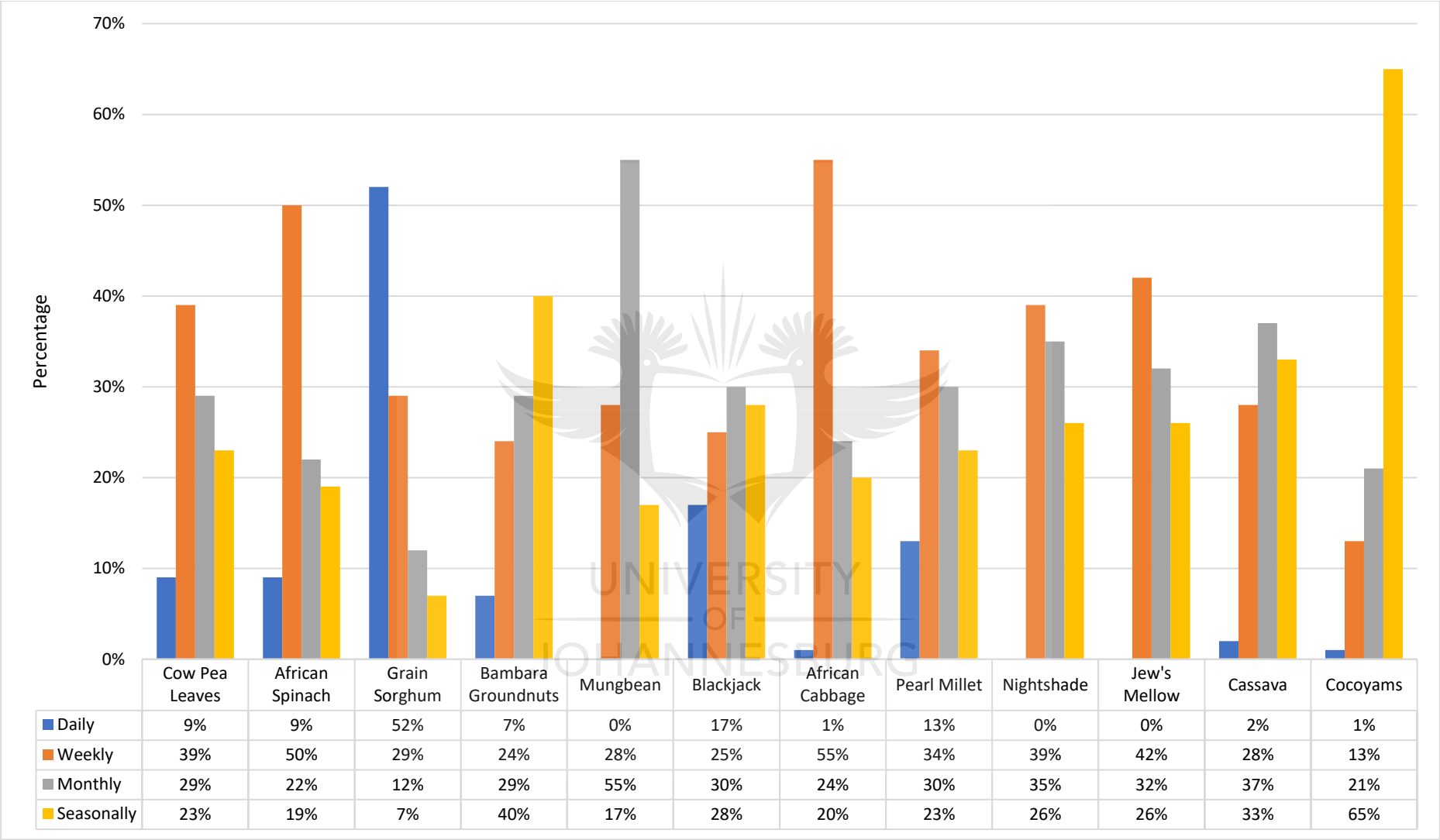
Table 4.4: Chi Square tests for Jews mellow consumption

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.072 [a]	1	0,000
Likelihood Ratio	16,806	1	0,000
Linear-by-Linear Association	15,952	1	0,000
N of Valid Cases	134		

Table 4.5: Chi Squares for Nightshade consumption

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.852 [a]	1	0,001
Likelihood Ratio	11,122	1	0,001
Linear-by-Linear Association	10,774	1	0,001
N of Valid Cases	140		

Foods such as Jews mellow (Pearson $X^2 = 16.072$, d = 1, p = 0.000) in Table 4.4, and nightshade (Pearson $X^2 = 10.852$, d = 1, p = 0.001) in Table 4.5, had a significant difference of consumption by respondents in rural and peri-urban areas.



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
Daily	9%	9%	52%	7%	0%	17%	1%	13%	0%	0%	2%	1%
Weekly	39%	50%	29%	24%	28%	25%	55%	34%	39%	42%	28%	13%
Monthly	29%	22%	12%	29%	55%	30%	24%	30%	35%	32%	37%	21%
Seasonally	23%	19%	7%	40%	17%	28%	20%	23%	26%	26%	33%	65%

Figure 4.8: Consumption frequency of indigenous crops in rural and peri-urban areas?

Figure 4.8 shows how often indigenous foods are consumed in rural and peri-urban areas together. Grain sorghum had the highest rate for daily consumption with 52 per cent of respondents. Crops such as Jew's mellow, nightshade, and mung bean were not consumed on a daily basis. African cabbage was the most consumed on a weekly basis by 55 per cent of respondents. On a monthly basis, crops like mung bean (55 per cent), cassava (37 per cent), and nightshade (35 per cent) were the most consumed. Cocoyams are consumed the most on a seasonal basis, by 65 per cent of respondents. In all likelihood, this was because cocoyam's are not available at certain times of the year. Some foods are consumed more often than others. African cabbage, African spinach, grain sorghum, and cowpea leaves are consumed more often than crops such as Jew's mellow, cassava, night shade, and black jack.

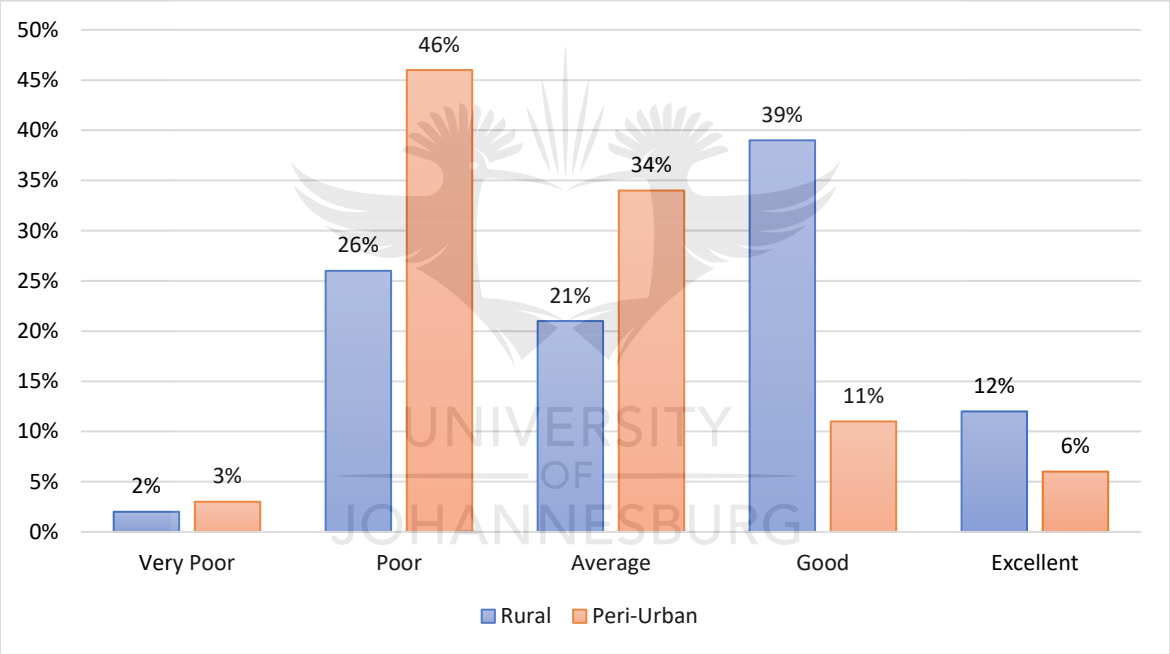


Figure 4.9: Availability of indigenous foods

The availability of indigenous foods in rural and peri-urban areas are shown above in figure 4.9. We can see that in rural areas 39 per cent of respondents had said the availability is good and 12 per cent of respondents noted excellent. Whereas in peri-urban areas only 11 per cent of respondents said good and 6 per cent said excellent. Of respondents, 21 per cent chose average in rural areas and 34 per cent in peri-urban areas. A large group of 46 per cent of respondents recorded they have poor availability of indigenous foods in peri-urban areas and only 26 per cent in rural areas.

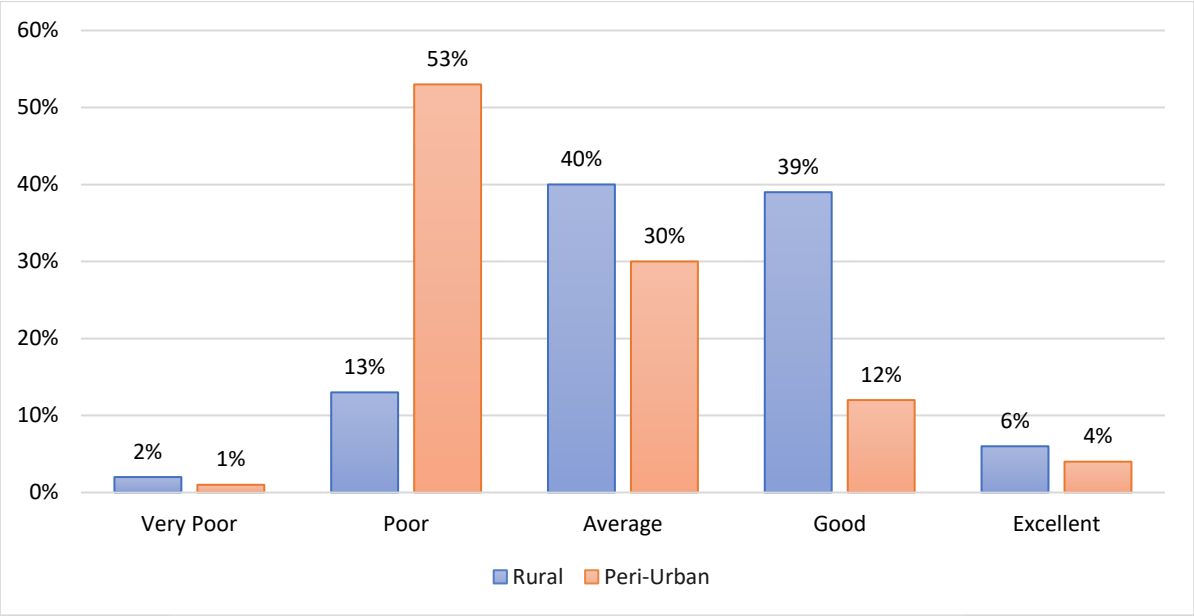


Figure 4.10: Ease of obtaining indigenous foods

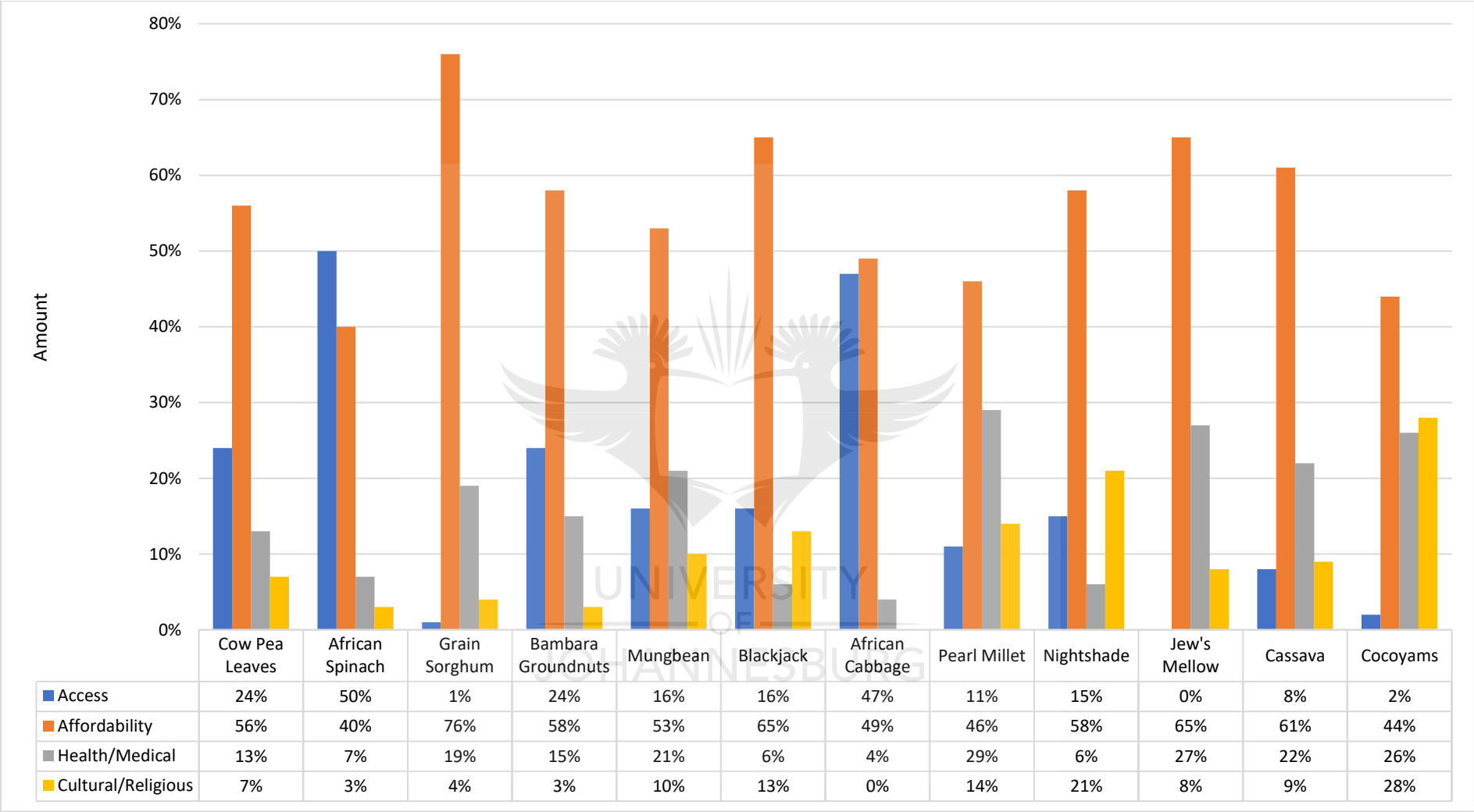
Figure 4.10 shows the respondent's ease of obtaining indigenous foods. Of respondents, 53 per cent in peri-urban areas and 13 per cent in rural areas stated that the ease of obtaining indigenous foods was poor. Of respondents, 40 per cent in rural areas and 30 per cent in peri-urban areas rated their experience average. The category good differs vastly, with only 12 per cent in peri-urban areas and 39 per cent in rural areas. Peri-urban areas had greater difficulty in obtaining indigenous foods than in rural areas.

4.3.3 Consumption reasons and preparation methods

Figure 4.11 represents the reason respondents in rural areas consumed certain indigenous foods. The main reason was affordability, and results in Figure 4.19 show that African spinach and African cabbage were grown in the garden as it was cheap to produce. Figure 4.11 shows that 50 per cent of respondents consumed African spinach and 47 per cent of respondents consumed African cabbage as it was easily accessible. Crops like Jews mellow (65 per cent of respondents) and blackjack (65 per cent of respondents) were affordable. Crops such as Jews mellow (27 per cent of respondents), cocoyams (26 per cent of respondents), and cassava (22 per cent of respondents) were eaten for medical / health purposes. There was a low response rate for cultural and religious reasons, with African cabbage having the lowest response rate for that field.

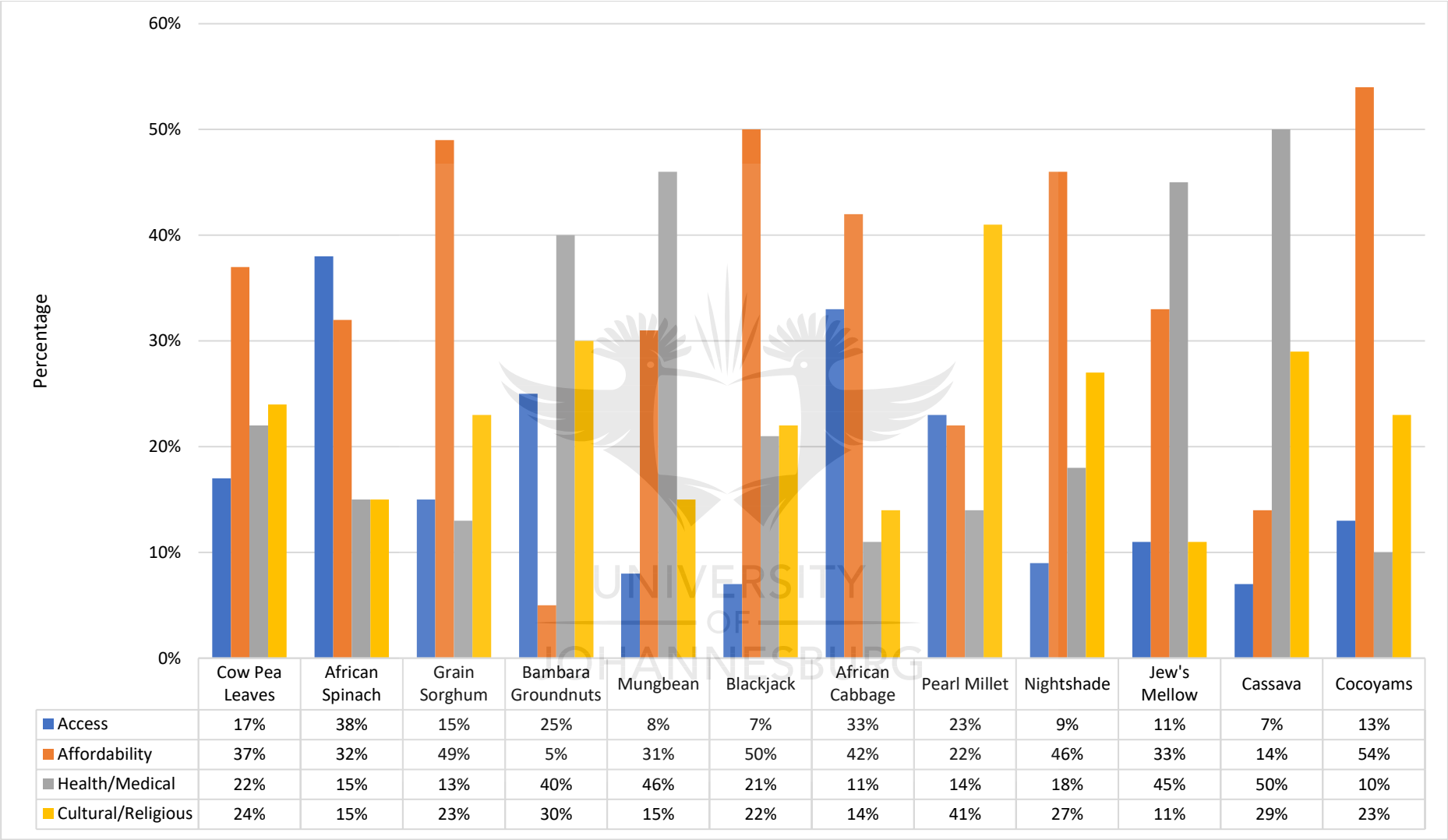
Figure 4.12 provides information on the reason indigenous foods were consumed in peri-urban areas. Access does not have a high response rate, except for two crops , African spinach (38 per cent of respondents) and African cabbage (33 per cent of respondents). Like Figure 4.10, the respondents rating of affordability is high in peri-urban areas as well. Cocoyams (54 per cent of respondents), blackjack (50 per cent of respondents), grain sorghum (49 per cent of respondents), nightshade (46 per cent of respondents), and African cabbage (42 per cent of respondents) all had a high response rate for affordability. Health and medical reasons had a low response rate with only two high responses being cassava (50 per cent of respondents) and Jews mellow (45 per cent of respondents).

Respondents in both rural and peri-urban areas rarely consume much indigenous foods for health and medical reasons. Cultural and religious reasons had a higher response rate from respondents in peri-urban areas than in rural areas.



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
Access	24%	50%	1%	24%	16%	16%	47%	11%	15%	0%	8%	2%
Affordability	56%	40%	76%	58%	53%	65%	49%	46%	58%	65%	61%	44%
Health/Medical	13%	7%	19%	15%	21%	6%	4%	29%	6%	27%	22%	26%
Cultural/Religious	7%	3%	4%	3%	10%	13%	0%	14%	21%	8%	9%	28%

Figure 4.11: Reasons for consuming indigenous foods in rural areas



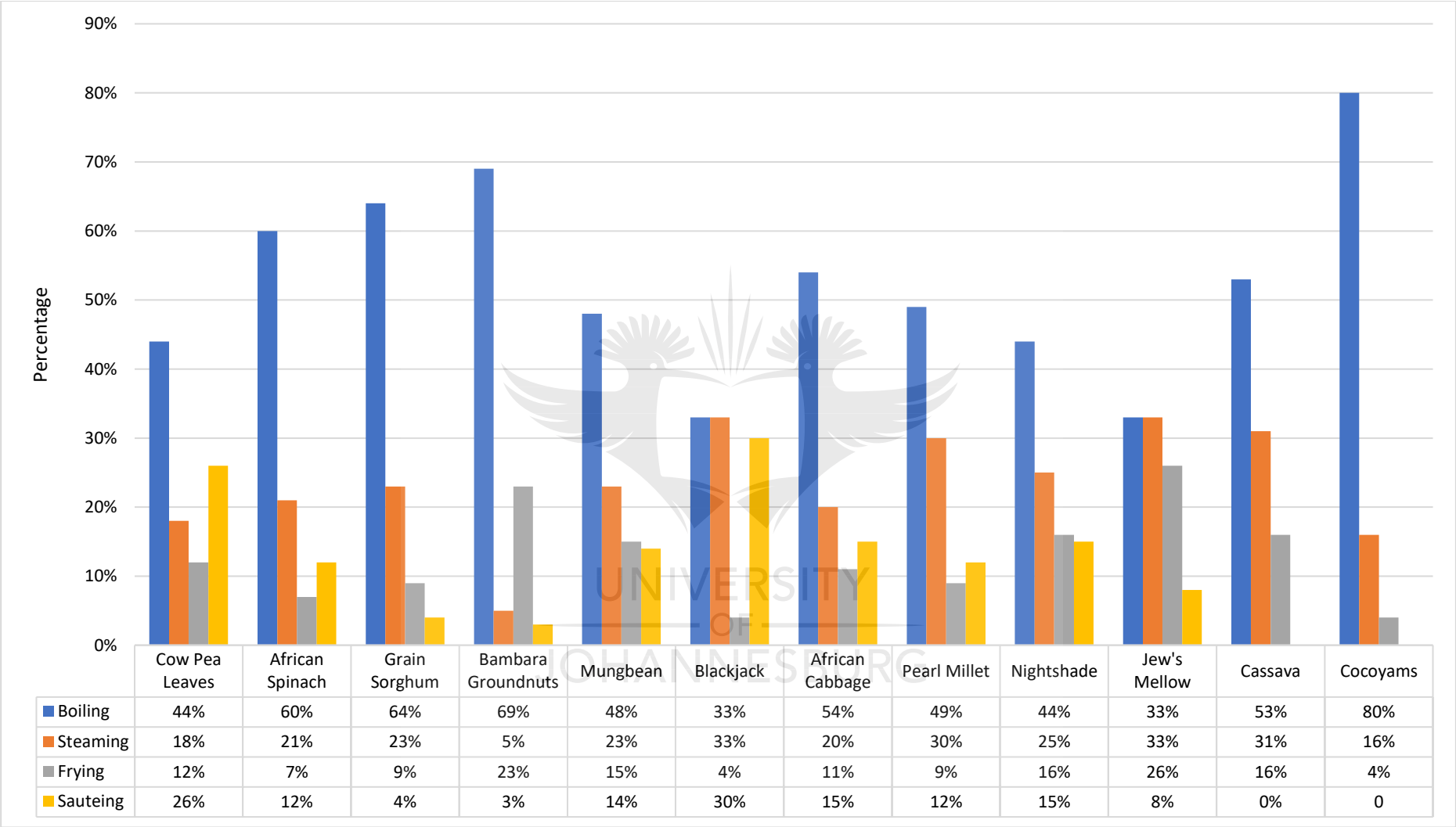
	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
Access	17%	38%	15%	25%	8%	7%	33%	23%	9%	11%	7%	13%
Affordability	37%	32%	49%	5%	31%	50%	42%	22%	46%	33%	14%	54%
Health/Medical	22%	15%	13%	40%	46%	21%	11%	14%	18%	45%	50%	10%
Cultural/Religious	24%	15%	23%	30%	15%	22%	14%	41%	27%	11%	29%	23%

Figure 4.12: Reasons for consuming indigenous foods in peri-urban areas

Figure 4.13 presents the findings for preparation methods used for various crops by respondents in rural areas. Boiling had the highest response rate as a preparation method. Crops such as cocoyams (80 per cent of respondents), Bambara groundnuts (69 per cent of respondents), grain sorghum (64 per cent of respondents), and African spinach (60 per cent of respondents) were mostly prepared using boiling as a preparation method. Steaming had a small response rate with plants like Jews mellow (33 per cent of respondents) and blackjack (33 per cent of respondents) using this method. Frying and sautéing had a low response rate, crops such as cocoyam's and cassava had not been sautéed in rural areas.

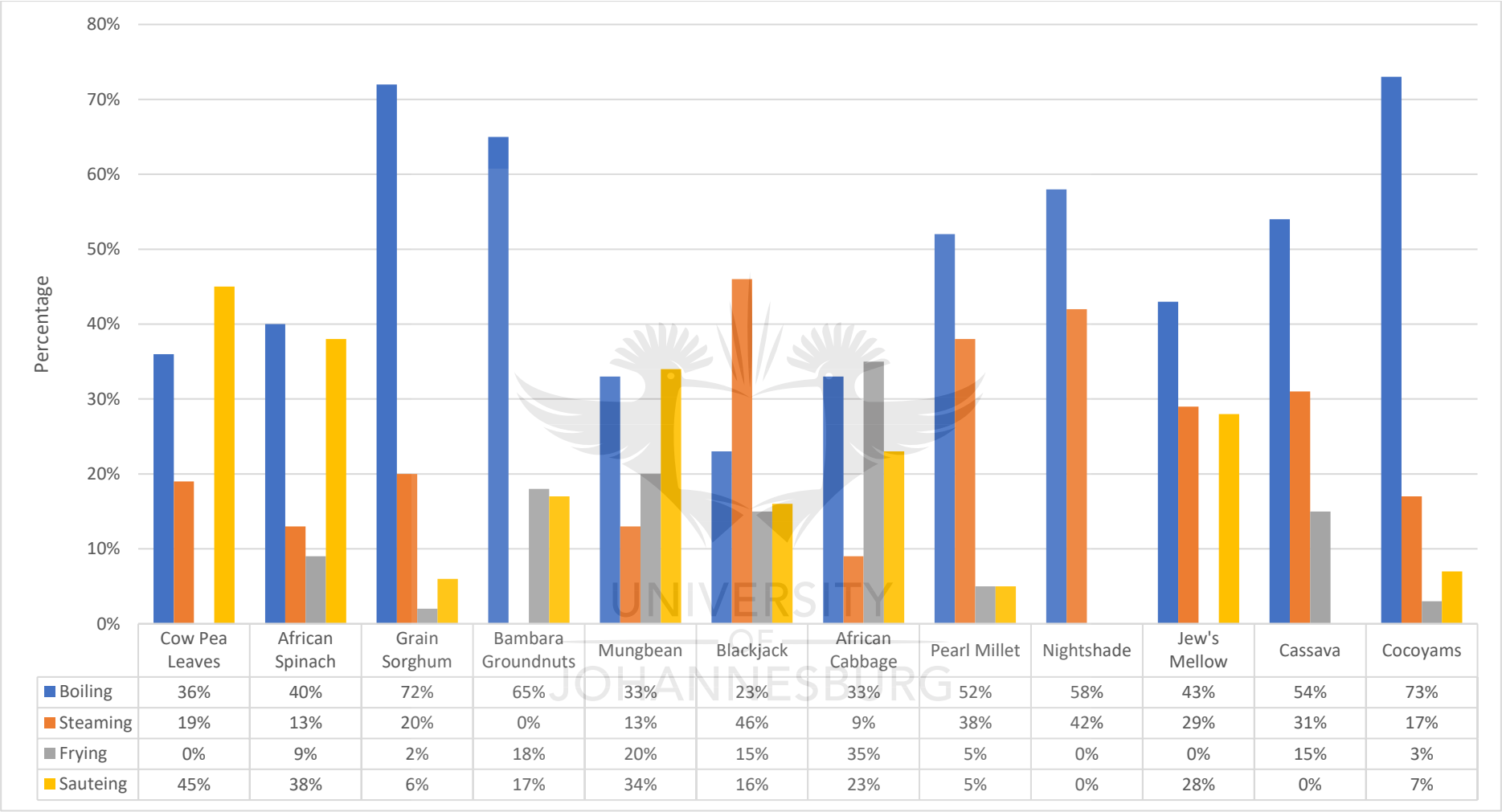
In Figure 4.14, the preparation methods used by respondents in peri-urban areas are presented. Like rural areas, boiling is the most commonly used preparation method in peri-urban areas. Cocoyams (73 per cent of respondents) and grain sorghum (72 per cent of respondents) had the highest rate for boiling. Steaming had an average response rate with the highest being 46 per cent for blackjack. Frying had a mixed response rate, 35 per cent of respondents used this method for African cabbage in peri-urban areas. Crops such as cowpea leaves, night shade and Jews mellow did not use frying as a preparation method. Sautéing had a mixed response rate in peri-urban areas where crops like cow pea leaves (45 per cent respondents), African spinach (38 per cent of respondents) and mungbean (34 per cent of respondents) had higher responses than crops such as pearl millet (five per cent of respondent) and pearl millet (five per cent of respondents).

Both Figure 4.13 and 4.14 shows us that boiling is the main preparation used with the indigenous foods researched. Even though steaming, frying, and sautéing are used by respondents in both peri-urban and rural areas, they differ with each crop.



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
Boiling	44%	60%	64%	69%	48%	33%	54%	49%	44%	33%	53%	80%
Steaming	18%	21%	23%	5%	23%	33%	20%	30%	25%	33%	31%	16%
Frying	12%	7%	9%	23%	15%	4%	11%	9%	16%	26%	16%	4%
Sauteing	26%	12%	4%	3%	14%	30%	15%	12%	15%	8%	0%	0

Figure 4.13: Preparation methods used in rural areas



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
Boiling	36%	40%	72%	65%	33%	23%	33%	52%	58%	43%	54%	73%
Steaming	19%	13%	20%	0%	13%	46%	9%	38%	42%	29%	31%	17%
Frying	0%	9%	2%	18%	20%	15%	35%	5%	0%	0%	15%	3%
Sauteing	45%	38%	6%	17%	34%	16%	23%	5%	0%	28%	0%	7%

Figure 4.14: Preparation methods used in peri-urban areas

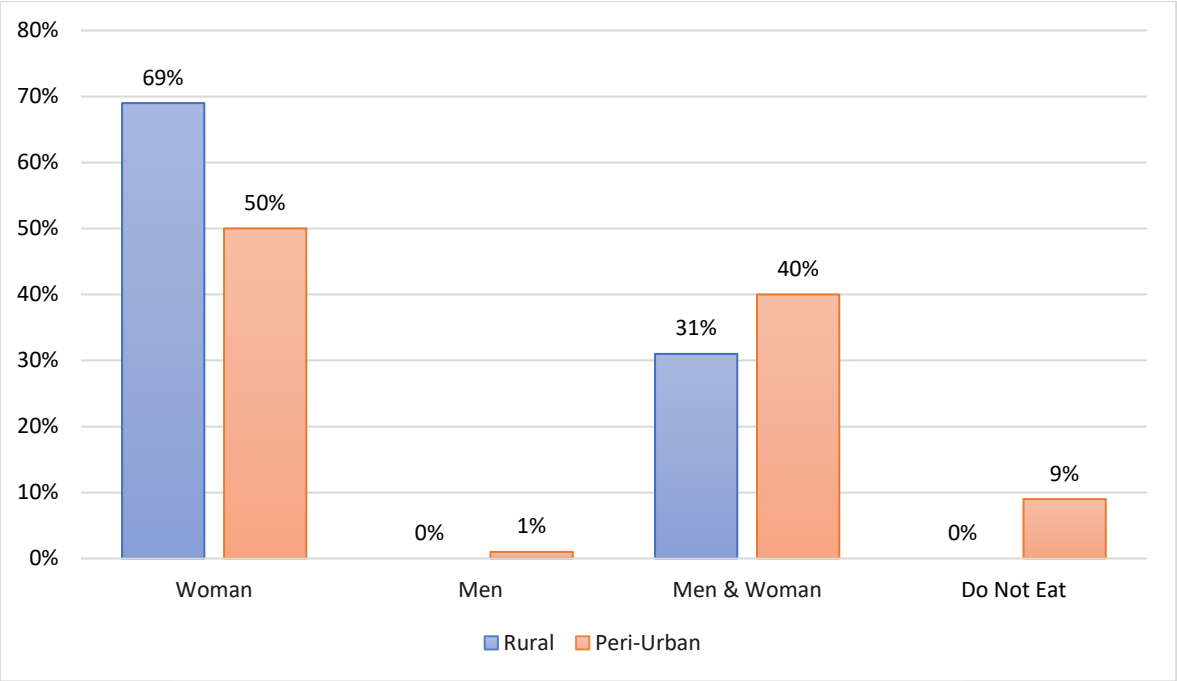


Figure 4.15: Indigenous foods preparation in the household

Figure 4.15 illustrates who in the household prepares indigenous foods. Women had the highest percentage for preparing indigenous foods, with 69 per cent of respondents in rural areas and 50 per cent in peri-urban areas. In rural areas, no men prepared food, and in peri-urban areas only one per cent of respondents stated that men prepared food. Of respondents, 31 per cent in rural areas and 40 per cent in peri-urban areas noted that both men and women prepared food equally. Lastly, zero people in rural areas said they do not eat indigenous food whereas nine per cent of people in peri-urban areas noted that they did not consume it.

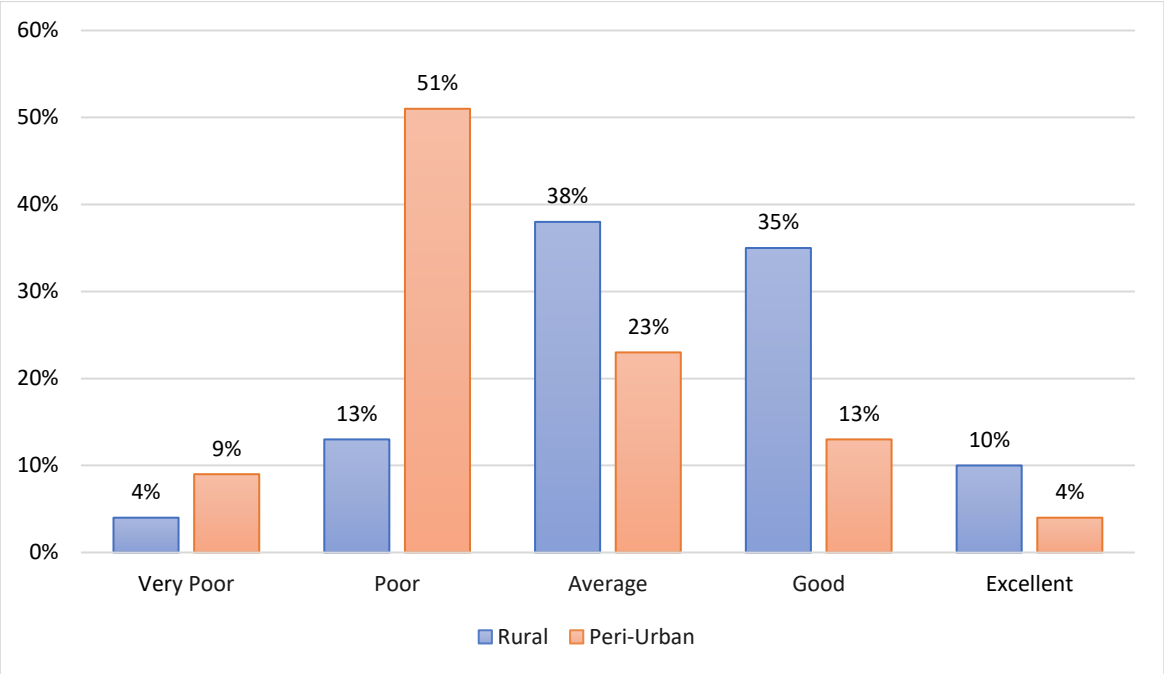


Figure 4.2: Ability to prepare indigenous foods

Figure 4.16 shows a higher response rate for respondents from rural areas being able to prepare indigenous foods. Only 13 per cent of respondents in rural areas thought their ability to prepare indigenous foods was poor, while 51 per cent of respondents in peri-urban areas chose poor. In rural areas, 38 per cent of respondents said their ability was average; while only 23 per cent of respondents in peri-urban areas rated themselves average. Rural areas had a high response for the category good with 53 per cent of respondents and a low 13 per cent for peri-urban areas. When comparing these results with those in Figure 4.1 (Does the nutritional value decrease when indigenous foods is prepared?), despite a high response rate in rural areas for their ability to prepare indigenous foods, the majority of respondents did not know if the nutritional value decreased when the food is prepared.

4.3.4 Peri-urban and rural comparisons

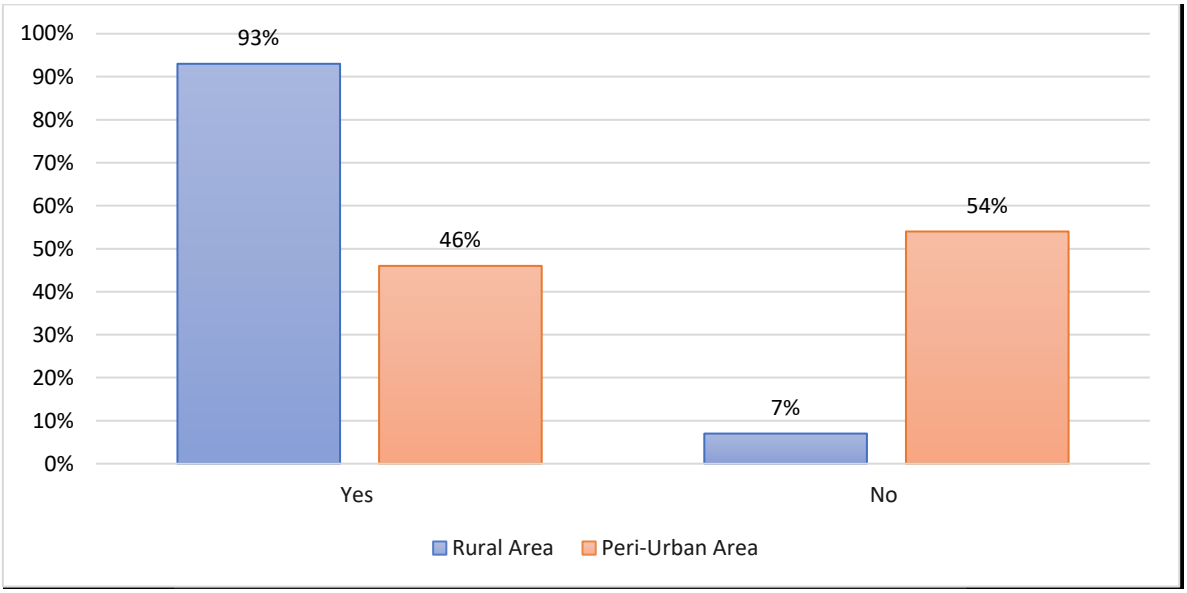


Figure 4.3: Personal consumption of indigenous foods

Figure 4.17 shows that 93 per cent of respondents in rural areas said they personally consume indigenous foods whereas in peri-urban areas this was lower at 46 per cent. A large number (54 per cent) of respondents said they do not consume indigenous foods in peri-urban areas, and in rural areas only seven per cent of respondents denied consumption.

The graph shows a large difference between respondents from rural and peri-urban areas in their consumption of indigenous foods. This is likely due to indigenous foods being easily and readily available in rural communities; along with personal preferences. In peri-urban areas a wider variety of foods are available to choose from and the environment affects what people consume.

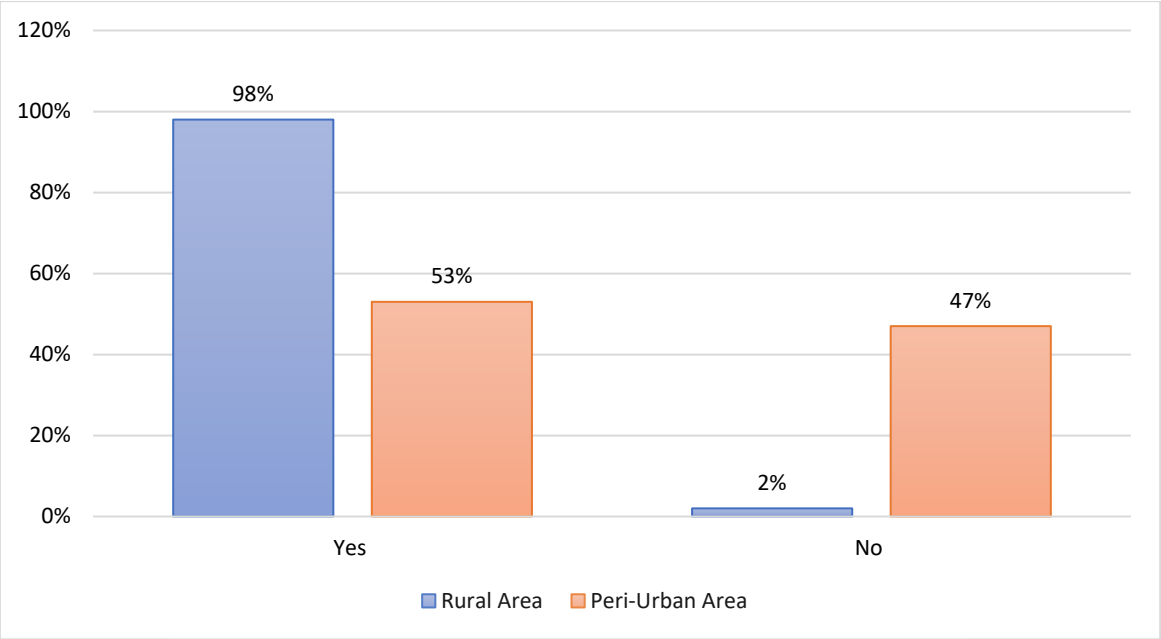


Figure 4.4: Consumption of indigenous foods by family members

Figure 4.18 illustrates that within rural areas 98 per cent of respondents noted that members of their household consume indigenous foods, whereas only 53 per cent of respondents from peri-urban areas recorded consumption by family members. Figures 4.17 and 4.18 show that indigenous foods are consumed primarily in rural areas; there is a huge gap in the consumption of indigenous foods between rural and peri-urban areas. Despite this gap, 53 per cent of respondents said their family consumed indigenous foods; these were mainly family members that had moved from rural areas (grandparents), and it was the food they preferred.

Figure 4.19 illustrates the various places that indigenous foods can be obtained in rural areas. Food markets were not a common source, 44 per cent of respondents said they obtained grain sorghum from food markets. Crops like blackjack and Jews mellow had not been bought at all in food markets. Residents rarely obtained indigenous foods from spaza shops. Respondents noted that crops such as cow pea leaves (44 per cent of respondents), African spinach (74 per cent of respondents) and African cabbage (61 per cent of respondents) was grown in the garden as is it easy and cheap to produce. The main and most used source for obtaining indigenous foods in rural areas was through vendors. All indigenous foods in the questionnaire were bought from vendors in rural areas.

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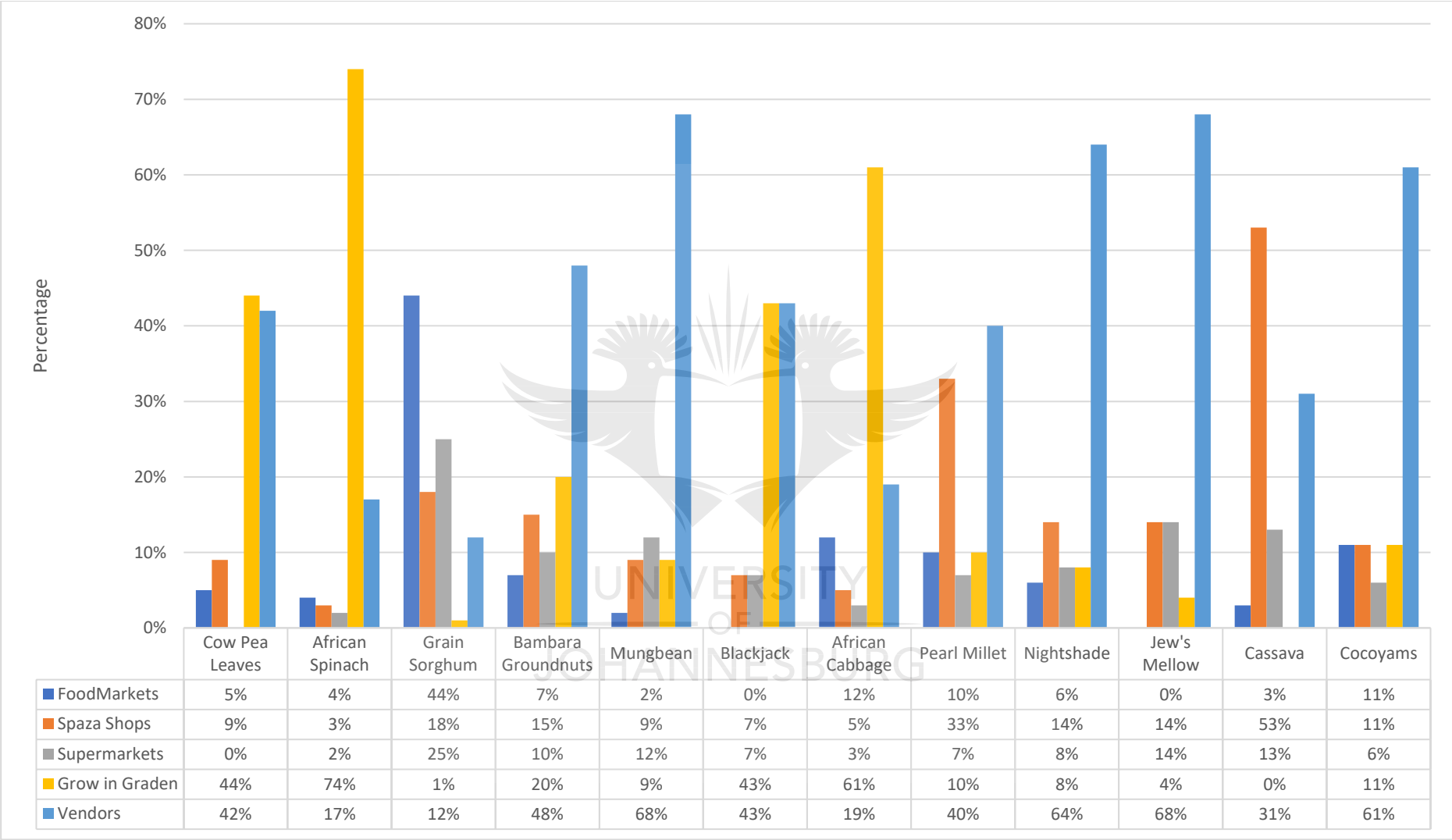
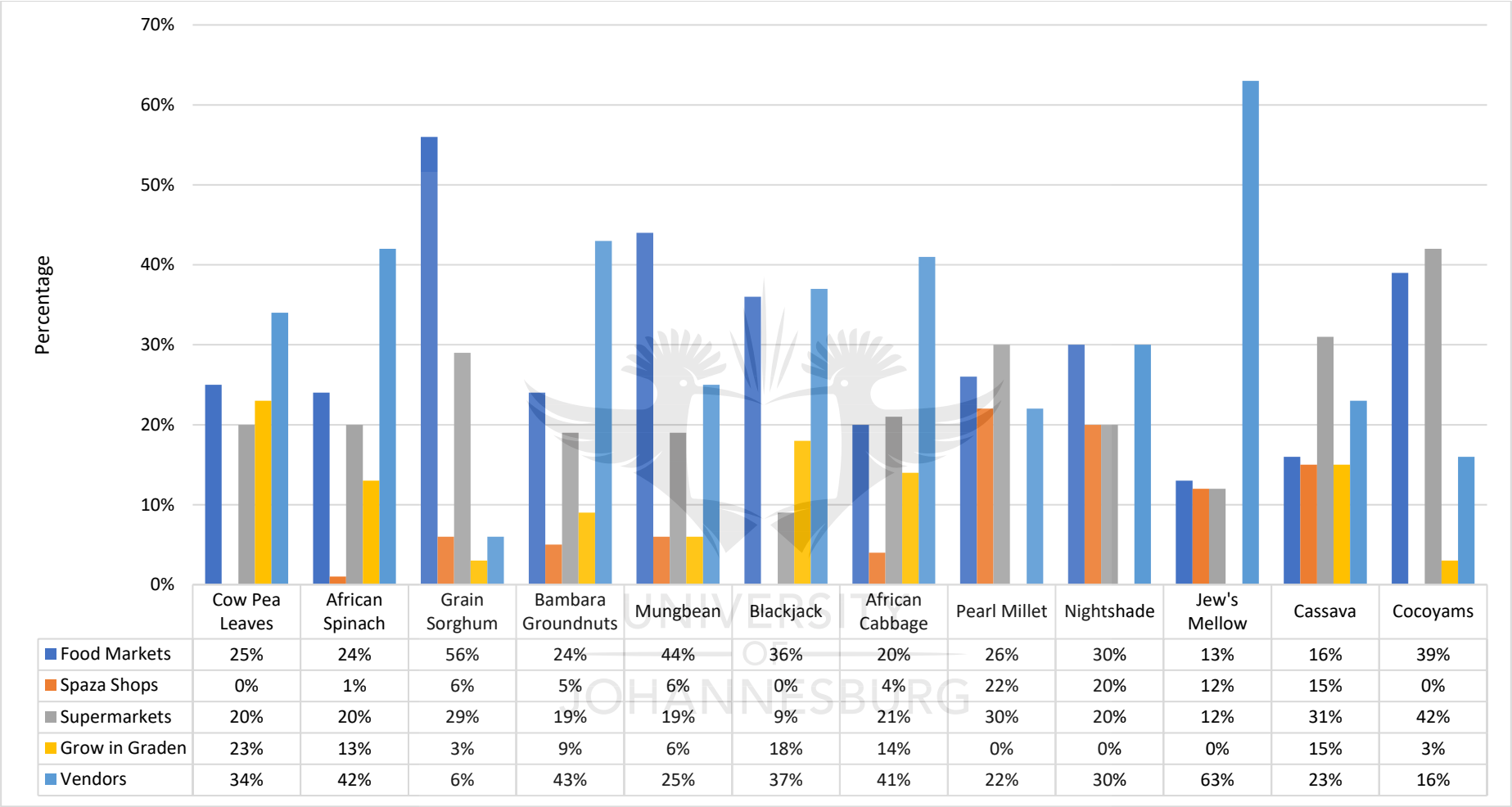


	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
FoodMarkets	5%	4%	44%	7%	2%	0%	12%	10%	6%	0%	3%	11%
Spaza Shops	9%	3%	18%	15%	9%	7%	5%	33%	14%	14%	53%	11%
Supermarkets	0%	2%	25%	10%	12%	7%	3%	7%	8%	14%	13%	6%
Grow in Graden	44%	74%	1%	20%	9%	43%	61%	10%	8%	4%	0%	11%
Vendors	42%	17%	12%	48%	68%	43%	19%	40%	64%	68%	31%	61%

Figure 4.5: Sourcing of indigenous foods in rural areas

Figure 4.20 illustrates where indigenous foods are obtained in peri-urban areas; it is evident that food markets are the main source of indigenous foods. Grain sorghum (56 per cent of respondents) and mungbean (44 per cent of respondents) were mostly bought from food markets. Spaza shops supplied little to no indigenous foods, while supermarkets provided a moderate number: with respondents buying cocoyams (42 per cent), cassava (31 per cent) and pearl millet (30 per cent). Crops grown in the garden in peri-urban areas was not common. Vendors supplied indigenous foods; mostly African spinach, Bambara groundnuts and African cabbage.



	Cow Pea Leaves	African Spinach	Grain Sorghum	Bambara Groundnuts	Mungbean	Blackjack	African Cabbage	Pearl Millet	Nightshade	Jew's Mellow	Cassava	Cocoyams
Food Markets	25%	24%	56%	24%	44%	36%	20%	26%	30%	13%	16%	39%
Spaza Shops	0%	1%	6%	5%	6%	0%	4%	22%	20%	12%	15%	0%
Supermarkets	20%	20%	29%	19%	19%	9%	21%	30%	20%	12%	31%	42%
Grow in Graden	23%	13%	3%	9%	6%	18%	14%	0%	0%	0%	15%	3%
Vendors	34%	42%	6%	43%	25%	37%	41%	22%	30%	63%	23%	16%

Figure 4.6: Sourcing of indigenous foods in peri-urban areas

Figure 4.19 and 4.20 show that respondents in rural areas obtained indigenous foods from vendors, whereas in peri-urban areas indigenous foods were sourced mostly from food markets. This is mainly due to their respective convenience in each area.

4.4 DISCUSSION

This section discusses the knowledge levels respondents have on indigenous foods, the variety of indigenous foods consumed, and the reasons for their consumption, along with the comparison of peri-urban and rural results.

4.4.1 Knowledge levels

From research results obtained it is evident that indigenous foods can help alleviate many nutrition issues facing South Africa is faced with. Figure 4.15 (Knowledge on nutritional value of indigenous foods) shows that knowledge levels on indigenous foods is average in both rural (47 per cent) and peri-urban (39 per cent) areas. In recent years, it was found that indigenous food knowledge had not been passed on from generation to generation. A study conducted by Masekoameng and Molotja (2019:2) stated that older members of the family are known to transfer indigenous food knowledge verbally from generation to generation; however, as time progressed this has lessened, as many people moved away from rural areas and sought our modern sugary foods to consume. Thus, knowledge on indigenous foods remains with the older generations and is being lost. South Africa and many other countries are faced with widespread malnutrition and poverty, and as years pass these numbers increase. Malnutrition has become a serious issue, and results obtained by Lemke and Delormier (2017:2) shows that indigenous plants could aid in decreasing malnutrition and poverty. According to Chadare, Madode, Fanou-Fogny, Kindossi, Ayosso, Honfo, Kayode, Linnemann, and Haunhauigan (2018:441), indigenous plants are good sources of antioxidants, vitamins E and C, polyphenolic compounds, as well as protein. These nutrients are needed by growing children; they help to increase physical and cognitive functioning. Figure 4.1 (Does the nutritional value decrease when indigenous foods are prepared?), shows that not many respondents were aware of the nutritional value of indigenous foods after preparation, as 20 per cent of respondents in rural areas and 22 per cent of

respondents in peri-urban areas said that the nutritional value decreased when prepared. This confirmed that very little is known on the nutrient value and positive impact of indigenous foods. Despite many respondents not knowing the impact of preparation; a large number, as shown in Figure 4.3 (Where would you like to see more indigenous food?), had great interest in the availability of more indigenous foods in places like supermarkets, hospitals, schools, and even the work place.

4.4.2 Common consumption

Many people do not know what constitutes indigenous foods, despite the consumption thereof. In rural areas, most people consume indigenous foods because they are cheaper and easier to produce than other crops (Abu & Soom, 2016:63). According to a study conducted by Ko et al. (2016:634), people in rural areas grow indigenous foods in their gardens, and small-scale farmers in the rural community grow them to sell on the roadside or through other informal means. Figure 4.11 (Reason for consuming indigenous foods in rural areas) shows that crops were consumed according to affordability, ease and cost of production, and ease of access. In peri-urban areas, individuals are surrounded by shopping malls and convenience stores and food can be sourced in a variety of places like vendors, spaza shops and supermarkets. According to Ver Ploeg et al. (2015:205), food outlets change from rural to urban areas. Research shows that access to food in a rural community is limited, due to not only transportation challenges, but also financial constraints. That is why most food is bought from vendors within the community (Proctor & Berdegue, 2016:2). The results shown in Figure 4.19, show that in rural areas indigenous foods are mostly obtained from vendors; while Figure 4.20 shows that most indigenous foods were sourced from food markets. According to Kasimba et al. (2018:1201), peri-urban life comes with better standards of living, thus access to more foods; however, not many respondents were knowledgeable about the benefits that indigenous foods hold, thus bought modern cash crops from food markets. The decrease in sales of indigenous foods would cause supermarkets to stop selling local indigenous foods.

4.4.3 Consumption reasons and preparation methods

As the years have progressed, the consumption of indigenous foods has decreased. Indigenous foods are known as 'old fashioned' because the older generation prepared such foods, while the younger generation has access to a large range of modern food (Gewa et al., 2019: 2958). Urbanisation has played a major role in the consumption of indigenous foods (Musotsi et al., 2017:31). Figure 4.17 (personal consumption of indigenous foods) shows that 93 per cent of respondents still consumed indigenous foods; which was contrary to a study by Bairagi et al. (2020:750), and showed that the availability of cash crops in rural farming areas decreased the consumption of indigenous foods. Figure 4.18 (consumption of indigenous foods by family members) showed that 98 per cent of respondents' family members consumed indigenous foods. Crush and Battersby (2016:149) stated that individuals in peri-urban areas have food at their fingertips allowing them to buy whatever they wanted, and consuming it whenever they wanted to. Figure 4.12 (reason for consuming indigenous foods in peri-urban areas) shows that peri-urban residents still chose affordability as their reason for consuming indigenous foods. These results did not match the results of other studies; possibly because even though peri-urban residents have access to many items and stores, the cost of living is high so people are always looking for a cheaper alternative. According to Simatenda et al. (2015), food preparation was done mostly by women, using a wood fire and either the boiling or roasting method. From the results obtained in this study (Figures 4.13, 4.14, and 4.15), respondents from both rural and peri-urban areas stated that food was prepared by women and boiling was the most common preparation method used. Women have labour-intensive work like collecting water and firewood. They also have responsibilities of taking care of children, cooking, as well as some agricultural tasks (Lemke & Delormier, 2017:3). Boiling was the easiest method, as respondents said not much was needed for boiling and was easily done over a fire in rural areas.

4.4.4 Peri-urban and rural comparisons

A study conducted by Beyazli et al. (2017:232) stated that the number of people living in rural households is high; most households consist of a minimum of four people with a high number of elderly people and children. A study conducted by

Gutura and Tanga (2017:173) stated that due to the unemployment rate being so high in South Africa not many people in rural households has a permanent job. Rural communities usually have to travel longer distances to work or school, where unforeseen circumstances such as weather see a number of missed days (Hart et al., 2015:1151). Few rural residents have a matric certificate or a tertiary education, hence those in rural communities are forced to rely on jobs that pay low salaries of between R2 000 and R5 000 per month (Allais, 2017:148). This research echoes this result: in Table 4.1 (Demographic profile of respondents) shows that 89 per cent of respondents had income levels between R500 and R9 999. In addition, 56 per cent of respondents had six or more people living in their rural household.

Living within a peri-urban area creates a better life without it costing significantly more; having schools and workplaces nearby increases the chances of better jobs and higher education (Tian et al., 2017:478), which corresponds with this study's results. Table 4.1 shows that 38 per cent of individuals had completed grade 8 to 12, and 26 per cent of respondents earned a salary of R25 000 to R50 000, and above. Intake of indigenous foods had decreased in rural and peri-urban areas and according to Cockx et al. (2018:145), the food consumption patterns of African people included a limited intake of indigenous foods. Due to modernisation of South African rural communities, people are led to perceive indigenous foods as inferior (Faber et al., 2010:31).

4.5 SUMMARY

The data collected from rural and peri-urban areas in Lenasia South and Soweto shows the sourcing and consumption of indigenous foods and the knowledge levels of the respondents on these foods. Despite a large number of respondents consuming indigenous foods, the majority lived within rural areas. This was due to easy access and cheap production. Rural respondents had high knowledge levels of the uses and consumption of indigenous foods as this knowledge was passed down by the older generation. Peri-urban residents were aware of indigenous foods but the knowledge levels related to identification, preparation and access was low. Access to modern methods of living and learning to adapt to a modern lifestyle had affected peri-urban respondents.

CHAPTER FIVE
CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

5.1 INTRODUCTION

In this chapter the conclusions, limitations, and recommendations of this study are discussed, providing ways in which it aims to fill those gaps.

5.2 CONCLUSIONS

The conclusions are discussed according to the objectives in this section.

5.2.1 Objective 1: Knowledge levels

Residents in rural areas were far more knowledgeable than those in peri-urban areas with regard to identifying, sourcing, consuming, and the nutritional value of indigenous foods. According to Hlalele (2019:90) this maybe because residents from rural areas were more exposed to indigenous foods and information about them was passed down from the elders in the household or community. Even though in peri-urban areas residents were aware of indigenous foods not many had in-depth knowledge of these foods. The knowledge that was gained in peri-urban areas was from what residents had read or heard, but mostly from those who grew up in rural areas and had moved to peri-urban areas.

5.2.2 Objective 2: Common consumption

The top four commonly consumed crops in both rural and peri-urban areas were African spinach, Africa cabbage, grain sorghum and cocoyams. African cabbage and African spinach were mostly consumed weekly, whereas grain sorghum was consumed on a daily basis, and cocoyams were consumed seasonally. African cabbage and African spinach had been widely consumed due to its easy availability in both rural and peri-urban areas.

5.2.3 Objective 3: Consumption reasons and preparation methods

In rural areas, the main reason for respondents' consumption of indigenous foods was affordability. Residents sourced indigenous foods from vendors or grew them

in their gardens and sold them at lower prices than supermarkets and food markets. Some would barter, for examples cocoyams for African spinach.

Indigenous foods in peri-urban areas were also consumed mainly for affordability but residents sourced their food from food markets.

The preparation methods used were sautéing, frying, steaming, and boiling. Boiling was the most common preparation method for indigenous foods; despite it being recommended as a nutritional and healthy method of preparation a lot of the nutrients, especially vitamin C, is lost in the water when boiled. Each method of preparation has its good and bad aspects, and certain precautions need to be taken with each method to ensure little to no loss; however, every method maximises some nutrients while diminishing others (Oluoch et al., 2017:236).

5.2.4 Objective 4: Peri-urban and rural comparisons

This research shows that respondents in rural areas had more knowledge and a better understanding of indigenous foods, than did their peri-urban counterparts. Most had a lower educational status but their knowledge on sourcing or growing indigenous foods, and preparing them was higher than respondents were in peri-urban areas. While a number of peri-urban area residents consumed indigenous foods, more than 50 per cent did not, and their knowledge levels were low. Respondents in rural areas consumed more indigenous foods than those in peri-urban areas. In most cases it was due to the lack of knowledge and limited access to indigenous foods.

5.3 LIMITATIONS

The limitations found in the course of this study included first, a limited number of current articles relating to the topic. There were many on the identification and nutritional value of indigenous foods but not many on the knowledge and consumption levels. The limitation had been found in South Africa and other African countries.

Second, the majority of the respondents did not speak fluent English; the language barrier created a time consuming problem, as the researcher had to explain each question to the respondents.

The third limitation was that the respondents found the questionnaire difficult to complete, especially the table in question 4, and long, despite the pilot survey that attempted to identify and eliminate problems.

Fourth, only residents from Soweto and Lenasia South participated in the study and this might not be a true reflection of rural and peri-urban residents, as people from other areas might have different views on indigenous foods.

Finally, ensuring that respondents resided in Soweto or Lenasia South became time consuming and was sometimes met with hostility as Soweto is a large township as well as a tourist attraction with many people coming from around Johannesburg or other provinces to visit the attractions there. People from other areas would come to these public places for shopping and entertainment. When approaching people in the malls we had to find out where they had resided first before continuing with the questionnaire.

5.4 RECOMMENDATIONS

5.4.1 Promoting indigenous foods

- Including indigenous foods in hospital menus, feeding schemes at schools, or community homes would help increase the knowledge levels of indigenous foods as well as the consumption thereof. Indigenous foods are easier and cheaper to produce, and have nutrients that are beneficial, especially to those suffering from malnutrition and food insecurity. As mentioned, activities in schools in both rural and peri-urban areas should include food nutrition and indigenous foods in their curricula. Schools should also have local food classes to promote both healthy indigenous foods and locally produced foods. Teaching children at a young age helps them create good habits.

- More agricultural activities should be implemented, such as creating more home and community gardens, local food productions, growing more trees

and planting other indigenous foods. Farmers and others should be trained on the nutrient rich indigenous foods. Promoting indigenous foods and raising indigenous knowledge levels through NGOs, churches, schools, and other community programmes can broaden the knowledge of younger and older generations.

- Having elders speak at community events and schools on indigenous foods and associated practices; some knowledge cannot be found in books or on the internet but from people's actual experiences, so having an elder share their knowledge can create awareness and encourage better lifestyles.

- The final recommendation would be to ensure indigenous foods are more accessible in various supermarkets. Many residents in peri-urban areas have very little access to indigenous foods and some travel out of their areas to obtain such foods. If supermarkets advertise and market these foods, the consumption could increase, and the knowledge levels surrounding indigenous foods would improve.

5.4.2 Future studies

- The questionnaire should have been shorter with questions requiring only an 'X' and not a written answer. Creating a shorter questionnaire that is easier to read would benefit future researchers.

- Having focus groups with a translator, or having the questionnaire translated into the African languages would be useful, as respondents would find it easier to answer a questionnaire in a language with which they are comfortable.

- For further studies, it is recommended that the sample be broadened, looking at other ethnic groups. The area could also be increased looking at Johannesburg as a whole, as well as other provinces. This will provide a broader understanding of knowledge levels and consumption patterns of indigenous foods.

5.5 CONCLUSION

To conclude, indigenous foods need to be more widely available. South Africans need to encourage the production and sale of indigenous foods, and promote its nutritional value. Not only will this extend the knowledge levels on indigenous foods, but also aid in rectifying malnutrition and food insecurity to create a better future for all.

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APPENDICES

APPENDIX A: POPULATION OF JOHANNESBURG

Area	Number
Johannesburg	**957441**
Klipfontein View	13320
Modderfontein	131
Lakeside	1163
Thornhill Estate	1669
Founders Hill	42
Bushwillow Park	911
Greenstone Hill	6122
Greenstone Park	340
Longmeadow Business Estate	29
Lombardy East	13406
Lombardy West	1059
Bramley View	4706
Crystal Gardens	292
Kew	5959
Raumarais Park	435
Bramley	1770
Winston Ridge	1031
Kentview	356
Sebenza	4
Westfield	0
Rembrandt Park	2382
Rembrandt Ridge	136
Corlett Gardens	2235
Formain	135
Lyndhurst	3813
Dunsevern	609
Dorelan	0
Linksfield	3696
Sunningdale Ridge	1012
Viewcrest	97
Silvamonte	568
Glenhazel	2991
Fairvale	419
Sandringham	2557
Fairmount Ridge	382
Glensan	448
Fairmount	1074
Percelia Estate	930
Highlands North	4914
Savoy Estate	1532
Gresswold	1442
Fairway	667
Birnam	1624
Waverley	2419

Area	Number
Birdhaven	984
Melrose	1103
Melrose Estate	730
Houghton Estate	7867
Abbotsford	388
Oaklands	1963
The Gardens	1262
Hawkins Estate	62
Rouxville	1366
Talboton	440
Raedene Estate	242
Sydenham	3368
Bagleyston	229
Cheltondale	888
Maryvale	85
Orchards	2282
Norwood	3075
Orange Grove	7751
Victoria	1288
Fellside	309
Riviera	1155
Killarney	5203
Parktown	6936
Forest Town	1072
Fairwood	349
Mountain View	358
Linksfield Ridge	4076
Observatory	490
Cyrildene	3417
Bruma	2260
Dewetshof	1425
Bezuidenhout Valley	9252
Judith's Paarl	2453
Randview	162
Bellevue East	8532
Bellevue	9323
Yeoville	18884
Berea	42801
Highlands	1457
Lorentzville	3032
Bertrams	3906
New Doornfontein	2022
Doornfontein	4484
Hillbrow	74131
Johannesburg SP	43166
Richmond	991
Melville	3355
Westdene	7815
Triomf	5371
Martindale	448
Westbury	13461

Area	Number
Hurst Hill	2321
Rossmore	1539
Auckland Park	3276
Uitsaaisentrum	386
Cottesloe	1403
Vrededorp	2742
Jan Hofmeyer	2645
Brixton	4067
Crosby	6112
Coronationville	4848
Industria West	10
Croesus	6
Industria	38
Mayfair West	4669
Langlaagte North	1292
South Kensington	1006
Kensington	19197
Troyeville	4154
Fairview	1716
Jeppestown	14795
Malvern	10525
Cleveland	2341
Denver	7257
Benrose	23
Wolhuter	1649
North Doornfontein	22
City and Suburban	2719
Marshalltown	4512
Ferreirasdorp	625
Newtown	2505
Fordsburg	2350
Mayfair	12027
Pageview	947
Longdale	2773
Paarlshoop	1890
Homestead Park	1423
Amalgam	108
Crown North	802
Selby	3323
New Centre	338
Village Main Reef Gold Mine	53
Ophirton	506
Crown	466
Crown Mine	154
Riverlea	16226
Droste Park	2995
Prolecon	35
George Goch	6616
Heriotdale	7
Rosherville	758
City Deep Gold Mine	1338

Area	Number
Springfield	31
Glenesk	1030
La Rochelle	5131
Regents Park	5703
Roseacre	1709
Moffat View	1918
Unigray	1319
Electron	38
Elandspark	4789
Steeledale	4
Klipriviersberg Estate	1374
Queenshaven	478
Park Central	0
Booysens	3163
Booysens Reserve	53
Theta	0
Ormonde	9823
Nasrec	5
Ormonde View	3299
Aeroton	11
Ridgeway	8723
Crown Gardens	4110
Evans Park	589
Robertsham	6727
Southdale	647
West Turffontein	8697
Reuven	466
Turffontein	15887
Kenilworth	9002
Rosettenville	17319
The Hill	4094
Rewlatch	1010
Moffat Park	0
South Hills	8715
Tulisa Park	1737
Risana	762
Linmeyer	2912
Oakdene	4931
Forest Hill	5744
Turf Club	1862
Lindberg Park	1156
Haddon	2271
Towerby	751
Chrisville	1133
Gillview	1027
Winchester Hills	9207
Suideroord	3556
Glenanda	3105
Bassonia	4633
Glenvista	10177
Klipriviersberg Nature Reserve	3

Area	Number
Mondeor	8021
Southgate	0
Doornkop Military Base	218
Johannesburg Prison	9742
Meredale	6227
Alan Manor	2283
Townsview	1096
Comptonville	574
Eikenhof SP1	1337
Naturena	13737
Devland	38684
Freedom Park	10755
Kibler Park 1	411
Eldorado Park	65698
Klipspruit West	10468
Mulbarton	6645
Risipark AH	1145
Liefde en Vrede	4086
Aspen Hills Nature Estate	1556
Eldorado Estate	440
Nancefield	695
Slovo Park	7810
Nancefield Industrial	234
Kibler Park 2	5618
Alveda	3493
Mayfield Park	1229
Eikenhof	4579
Soweto	1271628
Lenasia	89714
Kibler Park 1	411
Lenasia South	37110

APPENDIX B: RESEARCH QUESTIONNAIRE

INDIGENOUS FOODS KNOWLEDGE LEVELS AND CONSUMPTION PATTERNS OF JOHANNESBURG RESIDENTS

Questionnaire

Please answer the following questions by placing an 'x' over the relevant number/block or by writing down your answer in the space provided.

Example of how to complete the questionnaire if you are female:

What gender are you?

Male	1
Female	2

Section A- Demographic Characteristics

This section of the questionnaire covers background or biographical information. I am aware of the sensitivity of these questions and so this section shall only be used for statistical purposes. This information shall be kept strictly confidential and anonymous.

1. What gender do you belong to?

Male	1
Female	2

2. What age group do you fall into?

18-25	1
26-35	2
36-45	3
46-55	4
56-65	5
66+	6

3. What is your highest educational level?

Grade 0-7	1
Grade 8-12	2
Tertiary Education	3

4. How many people live in your household?

1-2	1
3-5	2
6 or more	3

5. What is your total household income (after taxes) per month?

Less than R500	1
R500 - R999	2
R1 000 - R1 999	3
R2 000 - R2 999	4
R3 000 - R4 999	5
R5 000 – R9 999	6
R10 000 – R14 999	7
R15 000 – R24 999	8
R25 000 – R34 999	9
R35 000 – R44 999	10
R45 000 – R54 999	11
R55 000+	12

6. Which culture do you belong to?

IsiZulu	1
IsiXhosa	2
Setswana	3
Sesotho	4
Venda	5
Other (please specify) _____	6

7. What area do you live in?

Rural Area	1
Peri- Urban Area	2

8. Where do you reside?

Lenasia South	1
Soweto	2

Section B- Indigenous Knowledge and Consumption Patterns

1. How would you define an Indigenous food?

_____
_____
_____

2. Do you personally consume any indigenous food?

Yes	1
No	2

3. Do any other members of your household consume indigenous food?

Yes	1
No	2

4. In the table on the next two pages is a list of crops that might be classified as indigenous. You have indicated you and/or other persons in your household eat indigenous foods. Please answer the following questions about these foods.

Crop	A: Do you consume this crop?		B: if yes, how often do you consume each of the crops ?					C: From where do/could you obtain each of the crops?						D: What are the reasons you consume the crop?				E: What are the methods of preparation used?			
	Yes	No	Daily	Weekly	Monthly	Seasonally	Never	Food Markets	Spaza shops	Supermarket	Grow in garden	Vendors	Do not know	Access	Affordability	Health / medicinal	Cultural / Religious	Boiling	Steaming	Frying	Sautéing
Cow Pea Leaves/ Morogo wadinawa	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
African Spinach/ Thepe	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Grain Sorghum/ Mabele	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Bambara Groundnuts / Ditloo	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Mung bean/ Dithlodi	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Blackjack/ Umhlabangubo	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4

Crop	A: Do you consume this crop?		B: if yes, how often do you consume each of the crops ?					C: From where do/could you obtain each of the crops?						D: What are the reasons you consume the crop?				E: What are the methods of preparation used?			
	Yes	No	Daily	Weekly	Monthly	Seasonally	Never	Food Markets	Spaza shops	Supermarket	Grow in garden	Vendors	Do not know	Access	Affordability	Health / medicinal	Cultural / Religious	Boiling	Steaming	Frying	Sautéing
African Cabbage/ Lerotho	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Pearl Millet/ Amabele	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Nightshade/ Umsobo	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Jew's Mellow/ Thelele	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Cassava/ Unjumbula	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Cocoyams/ Amdumbe	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4
Other (specify)	1	2	1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	1	2	3	4

Crop	A: Do you consume this crop?		B: if yes, how often do you consume each of the crops ?					C: From where do/could you obtain each of the crops?						D: What are the reasons you consume the crop?				E: What are the methods of preparation used?			
	Yes	No	Daily	Weekly	Monthly	Seasonally	Never	Food Markets	Spaza shops	Supermarket	Grow in garden	Vendors	Do not know	Access	Affordability	Health / medicinal	Cultural / Religious	Boiling	Steaming	Frying	Sautéing
_____																					

6. Whether you eat indigenous foods or not, how would you rate the availability of indigenous foods?

Very poor	1
Poor	2
Average	3
Good	4
Excellent	5

7. Who in the household mostly prepares indigenous foods?

Woman	1
Men	2
Women and men equally	3
We do not eat these foods	4

8. How would you rate your knowledge of the nutritional value of indigenous foods?

Very poor	1
Poor	2
Average	3
Good	4
Excellent	5

9. Does the nutritional value decrease when you prepare indigenous foods?

Yes	1
No	2
I don’t know	3

10a. Would you like to consume/eat indigenous foods more often?

Yes	1
No	2
Maybe	3

10b. Do you think other members of your community would like to consume/eat indigenous foods more often?

Yes	1
No	2
Don't know	3

11. Would you like to see more indigenous foods in schools, hospitals, supermarkets, and the workplace?

	Yes	No	Maybe
Schools	1	2	3
Hospitals	1	2	3
Supermarkets	1	2	3
Workplace	1	2	3

12. How would you rate your knowledge of Indigenous foods?

	Very poor	Poor	Average	Good	Excellent
How would you rate your ability to identify indigenous foods?	1	2	3	4	5
How would you rate your ability to prepare Indigenous foods?	1	2	3	4	5
How would you rate your ability to obtain Indigenous foods?	1	2	3	4	5

13. Do you think that indigenous foods can help aid in food insecurity?

Yes	1
No	2
I don't know	3

Please specify why

_____
_____
_____

14. How can indigenous foods be made more accessible to residents in Johannesburg?

_____
_____
_____

Please use the scale provided to rate your level of agreement or disagreement with each of the statements below:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I prefer modern food to traditional food	1	2	3	4	5
I am not concerned that traditional foods have been replaced by modern foods	1	2	3	4	5
I prefer traditional food to modern food	1	2	3	4	5
I would like to see modern foods replaced by traditional foods	1	2	3	4	5
I like to see traditional recipes being updated with a modern twist	1	2	3	4	5
It is good to mix traditional and modern foods	1	2	3	4	5

APPENDIX C: ETHICS LETTER

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SCHOOL OF TOURISM AND HOSPITALITY
College of Business & Economics

Wednesday, June 06, 2018

TO WHOM IT MAY CONCERN

This letter serves to confirm that Ms Yehshantha Govindasami, 201380860, is a registered Masters' student at School of Tourism and Hospitality with approved title "Indigenous food knowledge and consumption patterns of Johannesburg residents". The study has been granted ethical clearance from the Departmental Ethics Committee of the School of Tourism and Hospitality on Wednesday, 30 May 2018.

Yehshantha Govindasami's ethical clearance code is **STH043**

I trust the above is in order.

Yours faithfully

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APPENDIX D: EXPLANATORY LETTER

INDIGENOUS FOODS KNOWLEDGE LEVELS AND CONSUMPTION PATTERNS OF JOHANNESBURG RESIDENTS

Dear Sir/Madam

I, Yehshantha Govindasami, am a Masters student in the School of Tourism and Hospitality, University of Johannesburg. I am currently undertaking my research project, which focuses on the knowledge levels and consumption patterns of indigenous foods, of the residents in the Lenasia South and Soweto areas of Johannesburg. The research will be conducted through a questionnaire, divided into two sections. Section A comprises biographical questions, and section B shall comprises questions relating to the knowledge levels and consumption patterns of indigenous food.

Please complete the questionnaire by providing your knowledge of indigenous foods and consumption patterns. This questionnaire should only take up to 10 minutes of your time. Your response will contribute to an understanding of the importance of indigenous foods for residents in rural and peri-urban communities.

You are not required to enter your name or contact details on the questionnaire.

Summary of this research will be compiled in my final research project and will be available from the School of Tourism and Hospitality. Should you have any further queries please contact me on yehshanthagovindasami@gmail.com or 072 075 3841.

Yours Faithfully

Yehshantha Govindasami

APPENDIX E: CONFIRMATION OF COPYEDITING LETTER

phone: +27 83 304 4682
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member: Professional Editors Guild

2 November 2020

To whom it may concern

Confirmation of Copyediting

"INDIGENOUS FOOD KNOWLEDGE AND CONSUMPTION PATTERNS OF JOHANNESBURG RESIDENTS"

written by
YEHSHANTHA GOVINDASAMI

This letter serves to confirm that the dissertation detailed above was copyedited, proofread (grammar, spelling and punctuation), and formatted (layout and reference style) according to the requirements provided. A reconciliation of the in-text citations and the reference list was also undertaken.

Please contact the undersigned for any further information.

Yours sincerely

Angela Urban
urban writer